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CATALOGUE

OF THE

CHIROPTERA

IN THE

COLLECTION

OF THE

BRITISH MUSEUM.

BY

GEORGE EDWARD DOBSON,
M.A., M.B.

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PREFACE.

This Volume contains a complete account of all the species of Bats known at present, 400 in number, of which 85 are desiderata in the British Museum. In the year 1843, when the 'List of Mammalia in the Collection of the British Museum' was published by order of the Trustees, 136 species represented by 418 specimens were contained in the Museum; 2666 specimens are enumerated in this Catalogue, an increase chiefly due to the indefatigable zeal of the former Keeper of the Department, the late Dr. J. E. Gray, who at various times devoted himself to a systematic study of some of the families.

The present Catalogue probably contains only a fraction of existing species; but it is hoped that it will be a stimulus to collectors and students to pay more attention to this difficult and obscure group of animals than has been the case hitherto.

The Trustees have fortunately secured for the preparation of this Work the services of Mr. George Edward Dobson, M.A., who for many years has made this branch his special study.

ALBERT GÜNTHER,
Keeper of the Department of Zoology.

British Museum,
May 20th, 1878.

INTRODUCTION.

The total number of species described in the following pages is 400. The descriptions, with very few exceptions, are original, and have been taken directly from the types or from specimens which had been compared with the types. During the past four years the chief zoological museums on the continent of Europe were visited from time to time by me, and the types of the species described by Geoffroy, Temminck, Gervais, Peters, and Alph. Milne-Edwards examined and compared; while previously I had the rare advantage of seeing recent specimens of many species, and of studying their habits, when travelling in South America and during a residence of nearly four years in the East Indies. In the latter country the large collection of the Indian Museum at Calcutta, so inaccessible by reason of distance to most European zoologists, was examined, and full descriptions of the species were subsequently published in my 'Monograph of the Asiatic Chiroptera.'

As this is the first attempt to present in monographic form (not being a compilation) a natural history of any of the Orders of Mammalia, it has been my object throughout, not only to render the discrimination of the different species as easy as possible to those not possessing any special knowledge of the subject, but also, by full descriptions of the species, and by notes on their comparative anatomy, habits, and relative position in the natural series, to make this work as complete a systematic treatise on the Chiroptera as the present state of our knowledge and the space at my disposal would admit of.

The Classification adopted is the same as that propounded by me in a paper published in 1875 in the 'Annals and Magazine of Natural History,' and subsequently again set forth in the preface to my 'Monograph of the Asiatic Chiroptera,' where the grounds on which it is based are fully described and the relative affinities

of the genera discussed. In the Systematic Index the arrangement of the Families, Genera, and Species according to this method of classification may be seen; and notes on the natural position of each genus and species will be found in most cases attached to the definitions and descriptions throughout the work.

Instead, therefore, of reopening this subject, I think it preferable to occupy the space remaining at my disposal with an account of the Comparative Anatomy and Geographical Distribution of the species. In treating of the Comparative Anatomy I shall limit my remarks especially to those parts of the body which present the greatest variability in form, as a knowledge of the chief structural modifications, both external and internal, is all-important in systematically arranging the species.

Of all the orders of Mammalia none are so well defined as the Chiroptera: the presence of true wings at once distinguishes them; and this peculiarity is accompanied by other modifications of bodily structure having relation to aerial locomotion. Thus, in direct contrast to all other mammals (in which locomotion is chiefly effected by action from behind, and the hind limbs greatly preponderate in size over the fore), in the Chiroptera the fore limbs, being the only agents in propelling the body forward during flight, immensely exceed the short and weak hinder extremities; the thorax giving origin to the great muscles which sustain flight, and containing the proportionately very large lungs and heart, is remarkably capacious, and the ribs are flattened and close together; the shoulder-girdle also is greatly developed in comparison with the weak pelvic bones. Other structural modifications secondary to these are observable in the form of the bony skeleton, in the integumentary system, in the alimentary canal, and in other parts of the body, which I now proceed to describe under their several heads.

Osseous System.

The bones entering into the formation of the skeleton in Chiroptera are characterised by their slenderness, and by the great size of the medullary canals in those forming the extremities. The vertebral column is short, and the vertebræ differ very slightly in number and form throughout the species. The general number of the thoracico-lumbar vertebræ is 17, whereof 12 are thoracic and 5 lumbar. Occasionally species of the same family differ more from each other in the number of vertebræ than species of very distinct

families; thus *Phyllostoma hastatum* has 13 thoracic vertebræ, while *Artibeus perspicillatus* has 12. The cervical vertebræ are very broad, but short from before backwards. With the exception of the axis none of the cervical or thoracic vertebræ develop spinous processes, a characteristic feature in the osteology of the Order. From the first thoracic to the last lumbar vertebra the spinal column forms a single curve backwards, which is most pronounced in the lumbar region. The bodies of the vertebræ are very slightly movable upon each other, and in many old individuals appear to become partially anchylosed together. The caudal vertebræ are simple cylindrical bones without processes, and their number and length is extremely variable even in closely allied species; the anterior vertebræ are generally united to the tuberosities of the ischia. In all species of Megachiroptera (except in the very aberrant form *Notopteris macdonaldii*) the tail is very short or absent; in *Pteropus*, in some species of *Epomophorus*, and in *Melonycteris* there are no caudal vertebræ extending beyond the *tuber ischii*. In the Microchiroptera the tail reaches its greatest development in the Vespertilionine alliance*, in some genera of *Vespertilionidæ* (as in *Kerivoula*, *Natalus*, and *Miniopterus*) exceeding the length of the head and body, but the vertebræ rarely exceed 9 in number; in *Nycteridæ* the caudal vertebræ are very long in the genus *Nycteris*, very short and concealed in the base of the interfemoral membrane in *Megaderma*. In the Emballonurine alliance the tail is alone well developed in the *Molossi*, in *Rhinopoma*, and in some of the insectivorous species of *Phyllostomidæ*; in most of the genera of *Glossophagæ*, in all the frugivorous *Stenodermata*, and in the sanguivorous *Desmodontes* it is externally invisible or altogether absent. This shows that the development of the tail is correlated to the habits of the different species†.

In all Bats the presternum has a prominent keel for the attachment of the anterior portion of the great pectoral muscle; the mesosternum has a slightly prominent keel in most species of Microchiroptera, which reaches its greatest development in the *Rhinolophidæ*, especially in the genus *Triænops*, where it is nearly as deep as that of the presternum‡; the xiphisternum is moderately

* For definitions of the two alliances into which I have divided the families of Microchiroptera see Ann. & Mag. Nat. Hist. xvi. p. 347 (1875), or Monogr. Asiat. Chiropt. pp. 7, 8 (1876).

† For remarks on the development of the interfemoral membrane, see *infrà*, p. xxviii.

‡ See my paper "On the Osteology of *Triænops persicus*," and accompanying plate, in Journ. Asiat. Soc. Beng. xli. pp. 136–142, pl. vi. fig. 3 (1872).

broad behind, terminating in a broad cartilaginous process. In the Megachiroptera the segments of the mesosternum are distinct, in most species of Microchiroptera they are anchylosed together in adult individuals.

The ribs vary from 12 to 13 pairs; in most species they are much flattened and separated by very narrow intervals; in the *Rhinolophidæ* they are exceedingly flattened, and in some species occasionally found partially anchylosed together.

Of all parts of the osseous system the skull is most variable in form. This variability evidently depends chiefly on the different kinds of food used by different species, requiring special adaptation in the manducatory apparatus, changes in the form of which leading to very considerable modifications in the form of the skull. We would expect, therefore, to find the skull most variable in the *Phyllostomidæ* (for the species of that family probably vary more in the nature of their food than all the other species of Chiroptera); and this is certainly the case. In two species of this family, *Chœronycteris mexicana* and *Centurio senex*, we find the most extreme modifications of the skull observable in Chiroptera, the length in proportion to the breadth being as 30 to 11 in the former, and as 18 to 12 in the latter species (compare Plates XXVII. & XXVIII.). In the truly insectivorous families, the *Rhinolophidæ* and *Vespertilionidæ*, the skull is least variable; and in some of the genera of these families the difference between the species in this respect is very slight.

The elevation of the brain-case above the face-line varies very considerably in the different species of *Vespertilionidæ*, *Emballonuridæ*, and *Phyllostomidæ* especially. In some genera, as in *Furia*, *Amorphocheilus*, and *Mormops*, the crown of the head appears greatly elevated, in consequence of the peculiar manner in which the facial bones are bent upwards, so that the facial portion of the cranio-facial axis is almost at right angles to the basicranial; in *Miniopterus*, *Natalus*, and *Thyroptera* the brain-case in much vaulted and raised above the face-line, although the cranio-facial axis is almost in the same plane throughout.

Postorbital processes of the frontal are wanting in most of the species of Microchiroptera; they are either very short and obtuse or not developed in *Rhinolophidæ* and *Phyllostomidæ*. In some species of *Vespertilionidæ* (*Vesperugo pachypus*, e. g.) there are small blunt processes. In most of the species of *Nycteridæ* the frontal bones are greatly expanded laterally, forming triangular processes, the base of

which in *Megaderma* (as in *Pteropodidæ*) is perforated by a foramen (Plate X. fig. 3*a*; Plate XI. fig. 2); in the *Emballonuridæ* postorbital processes are scarcely developed in any of the genera except in those included in the group *Emballonuræ*, where, in most of the species, they are very long, and almost circumscribe the orbit. In Megachiroptera, however, long postorbital processes, having their bases traversed by a foramen, are well developed in nearly all the species; in the genus *Pteropus*, which includes the largest species of the order, they reach their highest development, and in several of the species there are corresponding processes from the zygomatic arches; but in *Pteropus leucopterus* alone is the orbital ring complete (see p. 32 and Plate IV. fig. 1).

The nasal bones vary considerably in length and form. In the Megachiroptera they reach their greatest length, extending so far in front that the nasal opening is small and directed forwards (Plate IV. fig. 1). In Microchiroptera (except in the group *Glossophagæ*) the nasals are generally short, especially in the leaf-nosed species of the Vespertilionine alliance, where the nostrils open on the upper surface of the muzzle; in the *Rhinolophidæ* they are raised in a vertical direction, supporting the highly developed foliaceous cutaneous appendages constituting the "nose-leaf"; in the *Phyllostomidæ* their form varies most considerably—in *Vampyri* and *Glossophagæ* long and narrow, in *Stenodermata* short and broad, or deficient, as in *Chiroderma*, where a deep fissure extends backwards between the orbits (Plate XXIX. fig. 3*b*), or much elevated, increasing the thickness of the muzzle in front, as in *Pygoderma* (Plate XXVIII. fig. 4*b*).

The greatest difference exists in the form and size of the premaxillary bones, in some cases even in those of species belonging to the same genus. In *Pteropodidæ* they are slender, but generally united in the centre; in *Rhinolophidæ* they are quite rudimentary, consisting of small osseous laminæ projecting forwards from the nasal cartilages; in *Nycteridæ* they are cartilaginous in *Megaderma* and small in *Nycteris*; in all the genera of *Vespertilionidæ* they consist of slender ununited bones supported by the upper maxillaries, and separated by a wide space in front (Plate XIII. figs. 2*a*, 3; Plate XIV. figs. 3*b*, 4*b*; Plate XV. figs. 5*b*, 6*b*). In those genera of *Emballonuridæ* which approach the *Vespertilionidæ* nearest in general structure, the premaxillary bones are also very feebly developed, and in one genus (*Taphozous*) they are cartilaginous, as in *Megaderma*; nevertheless they are less widely separated in front, and in this respect lead towards the more perfectly developed premaxillæ of such

genera as *Noctilio*, *Cheiromeles*, *Molossus*, and *Mystacina*, in which they are deeply united together, as in the allied family *Phyllostomidæ*. In all the genera of the latter family (except *Monophyllus*, *Ischnoglossa*, *Phyllonycteris*, *Lonchoglossa*, and *Glossonycteris*, of the group *Glossophagæ*) the premaxillaries are well developed and united in the centre (Plate XXIV. figs. 2, 6), reaching their culminating point in the sanguivorous group *Desmodontes*, where they support a pair of enormous trenchant incisors (Plate XXX. fig. 7*b*).

Zygomatic arches are well developed in *Pteropodidæ* (Plate IV. fig. 1) and *Rhinolophidæ*; in the latter family they reach their greatest size in *Triænops**; in *Emballonuridæ* and *Phyllostomidæ* they are slender, and in several genera of the latter family (*Carollia*, *Phyllonycteris*, *Glossonycteris*, and *Chœronycteris*) wanting. The depth of the sagittal and occipital crests varies much in different species, even in those of the same genus, and evidently depends chiefly on the size of the muscles of mastication, which have their origin from the sides of the skull, the development of these muscles again depending on the nature of the food of the animal with which the form and size of the teeth are correlated. Thus in *Desmodus rufus*, which lives on the blood of animals, and in which the grinding-teeth are rudimentary, the crown of the skull is quite smooth, without trace of either occipital or sagittal crests.

In the Megachiroptera the bony palate is broad behind, produced behind the last molars, and gradually narrowing backwards (Plate IV. fig. 6); in Microchiroptera it is abruptly narrowed in a line with the last molars, and produced backwards, forming the floor of the posterior nares (Plate XIV. fig. 5*a*, Plate XXIV. fig. 3); or in some genera of *Phyllostomidæ* (*Stenoderma*, *Pygoderma*, *Ametrida*) the horizontal plates of the palate-bones are partially or wholly deficient, and the palate is deeply cut as far forwards, in some species, as a line drawn between the first upper molars (Plate XXVIII. figs. 2–4). The two species included in the group *Furiæ* have been placed in separate genera, chiefly on account of the different development of the horizontal plate of the palate-bones, although otherwise very closely allied (see pp. 356, 357), so that it is doubtful how far this difference in structure can be regarded as a generic character.

The auditory *bullæ ossea* vary considerably in the different species in size, which appears to be correlated with that of the external ear, though exceptions to this rule are not wanting, as, for instance,

* See my paper "On Osteology of *Triænops persicus*," and plate, referred to above, footnote, p. vii.

in *Chalinolobus* (Plate XIV. fig. 5 *a*) and *Miniopterus*, where, although the ear-conch is small, the *bullæ osseæ* are remarkably large. The tympanic is thin-walled and very loosely connected with the surrounding bones, and does not develop an external canal; the spiral turns of the cochleæ are generally distinctly visible externally through the very thin walls of the capsule, and in some species number as many as four. In the *Rhinolophidæ* the auditory *bullæ osseæ* attain their greatest size (especially in the genus *Rhinolophus*, where they nearly meet in the middle line, the intervening basi-occipital bone being reduced to a narrow isthmus); and it is noteworthy that in these Bats the tragus is not developed*.

Paroccipital processes are present in most of the genera; they reach their greatest development in Megachiroptera, where they are rather long and narrow; in Microchiroptera they are comparatively much smaller, especially in the family *Vespertilionidæ*.

The shoulder-girdle varies very slightly in the different families, having the same office to fill in all. The clavicle is always very strong, long, and curved; the scapula large, oval-triangular in outline; the postscapular fossa greatly exceeds the anterior fossa, and is deeply concave for the origin of the large muscles arising therefrom; the spine of the scapula is well developed, with a large acromion; the coracoid is long and curved.

The humerus is long, but compared with the radius is scarcely two thirds its length; the form of its upper extremity varies very slightly; the external and internal tuberosities are prominent, the internal being the larger; the pectoral ridge is enormously developed for the insertion of the great pectoral muscle, and the inner side of its base is marked by the groove for the deltoid tendon; the shaft of the humerus is smooth and cylindrical; the distal extremity has, in all species, a large entocondyloid tuberosity, which, in some species (especially in the species of *Rhinolophidæ*) is very large, in the genus *Tricænops* developing a long styloid process†; the articular surface is marked by a deep sigmoid notch; there is no anconeal fossa nor supracondylar foramen. The ulna is rudimentary; its proximal extremity, which articulates with but a small part of the humerus posteriorly and externally, is anchylosed with the radius; immediately beyond the joint it is reduced to a very slender splint-like bone more or less curved backwards and separated from the

* See remarks on the tragus, *infrà*, p. xix.

† See plate vi. figs. 4, 4 *a*, Journ. Asiat. Soc. Beng. pt. ii. (1872), referred to above, in footnote, p. vii.

radius, with which it coalesces about the middle. In all species a detached sesamoid bone exists in the tendon of the triceps muscle, and is generally found in skeletons. The radius forms, with the humerus, almost the whole elbow-joint; it is very long, in some species (*Phyllorhina commersonii* and *Ph. tricuspidata*, e. g.) as long as the head and body.

The proximal row of the carpus consists of a single bone (the united scaphoid, lunar, and cuneiform bones), which, with the extremity of the radius, forms the radiocarpal joint: in the distal row the trapezium, trapezoid, and os magnum vary much in size in the different families; the unciform appears to be the most constant, and the pisiform is generally very small. But the chief differences in the bones of the carpus and their articulations are observable between those of the Megachiroptera, in which the thumb and second finger are so well developed, the latter generally with a distinct claw, and the Microchiroptera, in which the same digits are comparatively much smaller, and the second finger has a single rudimentary phalanx only* unprovided with a claw. In the Megachiroptera the trapezium is by far the largest bone in the distal row; its inner surface is deeply grooved for articulation with the trochlear extremity of the metacarpal bone of the thumb; its distal extremity fills up the space between the base of the metacarpal bones of the thumb and first finger, with which it articulates, while its proximal end forms a rounded head, which is received into a deep depression between the united scaphoid and lunar bones. The trapezoid is very small and quadrate above, articulating with the outer portion only of the second metacarpal bone; the os magnum is next in size to the trapezoid, and the unciform is but slightly smaller than it; the pisiform is very small, with a circular upper extremity. In the Microchiroptera, even in the frugivorous species of *Phyllostomidæ*, the trapezium is much smaller than either the os magnum or unciform, and does not much exceed the trapezoid in size, while its articulation with the concave extremity of the metacarpal bone of the thumb is very simple, and its proximal extremity is not received into a deep concavity in the scapho-lunar bone; the trapezoid has a long wedge-shaped distal process, which, with the end of the trapezium, is received into the space between the extremities of the first and second metacarpal bones, the latter almost wholly articulating with it; the unciform is as large as the os magnum, and the pisi-

* With the single exception of *Rhinopoma*, in which the index finger has two small phalanges (*vide infrà*, p. xiii.).

form is much larger than in Megachiroptera. On the dorsal aspect of the wrist, in *Phyllostoma hastatum*, there are three well-developed sesamoid bones—one on the radial side, protecting the radiocarpal joint internally, another covers the metacarpo-carpal joint of the thumb, while the third and largest overlies the articulation of the os magnum with the second and third metacarpal bones.

The manus is, in all the species, composed of five digits. The first, fourth, and fifth respectively consist of a metacarpal bone and two phalanges; in the second and third the number of phalanges is different in certain families.

The first finger (or thumb) always terminates in a claw, which, with the proximal phalanx, is most developed in Megachiroptera* and in the frugivorous species of *Phyllostomidæ*. The second finger reaches its highest development in Megachiroptera, consisting of a metacarpal bone and three phalanges, the terminal phalanx being provided with a claw (except in *Eonycteris*, *Notopteris*, and *Cephalotes*). In these three genera (which include only a single species each) the third phalanx is short but quite distinct, and is included in the wing-membrane. In nearly all the species of Microchiroptera, on the other hand, there is a single rudimentary phalanx only in the second finger; and in *Rhinopoma microphyllum* alone are two phalanges found. The presence, therefore, of three phalanges in the middle finger is characteristic of the Megachiroptera†. In the *Rhinolophidæ* there is no distinct phalanx in the second finger; a slight thickening like a joint terminates the osseous portion of the metacarpal bone, but I have not been able to distinguish a true articular surface. In the *Nycteridæ*, *Vespertilionidæ* (except *Thyroptera*), and *Phyllostomidæ* there is a short but generally distinct phalanx; in *Thyroptera* (in other respects also a most anomalous genus, *vide infrà*, p. xiv) the second finger is represented by a rudimentary metacarpal bone only. In the *Emballonuridæ*, especially in the genera in which the first phalanx of the third finger is folded (in repose) forward upon the upper surface of the metacarpal bone, the second finger is formed by the metacarpal alone; in *Noctilio* (which so

* The species of this Suborder, when feeding, grasp the fruit between the claws of the thumb and second finger. These fingers are, to a certain extent, opposable in these Bats, and this is evidently rendered possible by the different form and mode of articulation of the trapezium and trapezoid bones, compared with the same parts in Microchiroptera.

† This character has been accidentally omitted from my definitions of the Suborders at p. 2.

closely approaches the *Phyllostomidæ* through *Chilonycteris*) there is a very imperfect joint, with a slender bony phalanx about 0·15 inch long, and in *Rhinopoma* (as above remarked) there are two distinct phalanges. In the very remarkable genus *Cœlops* (*Rhinolophidæ*) alone is the metacarpal bone of this finger longer than that of the third.

The third or middle finger is by far the longest, and, except in the *Phyllostomidæ*, has two phalanges, as in the fourth and fifth fingers. In the *Phyllostomidæ*, and in the anomalous genera *Thyroptera* and *Mystacina*, there is a third phalanx, which evidently corresponds to the cartilaginous extremity of the second phalanx in the other families of Microchiroptera; for in some of the larger species of *Molossi* there is an imperfect joint terminating the osseous portion of the second phalanx of this finger, and in *Molossus perotis* (the largest of that group) I have observed a distinct joint dividing this bone into two. Compared with the fifth finger, this finger reaches its greatest length in the *Emballonuridæ* and *Phyllostomidæ*. In the genera *Taphozous* and *Diclidurus*, and in the group *Molossi*, the metacarpal bone equals or slightly exceeds the whole length of the fifth finger. The metacarpal bone of the third finger is generally longer than that of the fifth; but in the genera *Pteropus* and *Rhinolophus*, in the *Nycteridæ*, and in many of the genera of *Phyllostomidæ* it is shorter than it.

While the metacarpal bones of the fourth and fifth fingers are generally but slightly shorter, and in some cases exceed in length that of the third finger, the phalanges of the same fingers vary greatly in length in different families and in different species of the same family. In Megachiroptera, as in the case of the other fingers also, they reach their highest development, and equal, or even slightly exceed, the proximal phalanx in length. In Microchiroptera they are well developed in *Rhinolophidæ* and in *Nycteridæ*, considerably shorter in proportion to the length of the metacarpals in *Phyllostomidæ*, and least developed in *Emballonuridæ*, especially in the group *Molossi* and in the genera *Taphozous* and *Diclidurus*. In these genera the terminal phalanx of the third finger is very short and its distal third cartilaginous. As the antero-posterior diameter of the wing depends on the length of the fourth and fifth fingers, and its lateral extent on the third finger, this family is characterized by the length and narrowness of the wings, which confers on the individuals of each species the power of exceedingly rapid flight, contrasting remarkably with the comparatively slow oar-like motion of the broad wings of the species of *Pteropodidæ*.

In the genus *Tricnops* alone a very peculiar short bony process projects from the outer side of the proximal extremity of the terminal phalanx of the fourth finger. (See p. 124, and plate in Journ. Asiat. Soc. Bengal, referred to in footnote above.)

As might be expected from their aerial mode of locomotion, the pelvic girdle of Chiroptera is very weak. The iliac bones are long and narrow. In most species the pubic bones of opposite sides are very loosely united in front in males, in females they are widely separated; in the *Rhinolophidæ* alone do these bones form a symphysis. The *eminentia ileo-pectinea* develops in all species a long pectineal process; in the subfamily *Phyllorhininæ* alone this process is united with a similar one proceeding backwards from the anterior extremity of the ilium, bridging the space between, and forming a large preacetabular foramen, larger than the obturator foramen which is placed posterior and slightly inferior to it. (See plate vi. figs. 7, 8, 14, in Journ. Asiat. Soc. Bengal, referred to above.) This form of the pelvis (first described and figured by the writer) appears to be unique among mammals, and occurs in no other known species of Bats.

The acetabulum is small and directed outwards and slightly upwards, and with this is related the peculiar position of the leg, which is rotated outwards and upwards, so that when the animal is resting on the ground the knee is directed upwards as in a grasshopper. In striking contrast with the great development of the anterior extremities, the posterior limbs are small and generally weak, the combined length of the femur, tibia, and foot rarely equalling that of the forearm alone. The femur is, like the humerus, slender and cylindrical, with a small head and very short neck; the trochanters are prominent and nearly equal in size; its form differs very slightly throughout the species. The bones of the leg and foot are more variable. In the subfamily *Molossinæ* alone, in which the legs are short and strong, is there a well-developed fibula. In all other species this bone is either very slender or cartilaginous and ligamentous in its upper third, or reduced to a small bony process above the heel, as in *Megaderma*, or altogether absent, as in *Nycteris*.

The foot consists of a very short tarsus, and of long, slender, laterally compressed toes, with much-curved claws; the *os calcis* terminates (in nearly all the species) in a long cartilaginous process, the *calcaneum*, which acts as a support to the posterior margin of the interfemoral membrane, and is most developed in those species

in which the interfemoral is very large and the tail rudimentary or perforating the membrane and appearing upon its upper surface, as in most of the genera of *Emballonuridæ*, and in the groups *Mormopes* and *Vampyri* of *Phyllostomidæ*.

The first toe is composed of a metacarpal bone, a proximal and an ungual phalanx, and is slightly shorter than the other four toes, which have each an additional phalanx, except in the subfamily *Phyllorhininæ* and in the anomalous genus *Thyroptera*, where all the toes have the same number of phalanges as the first toe and are equal to it in length. In the very remarkable genus *Cheiromeles* the first toe is thumb-like and separated from the others; in the *Molossi* the first and fifth toes are much thicker than the intermediate toes.

Muscular System.

Few striking differences are observable in the muscular system of the Chiroptera. As Dr. Macalister remarks, "a strong family likeness pervades the entire series; the differences are chiefly slight, though often suggestive, varieties of detail"*. As the few differences known are of little importance in their bearing on the systematic arrangement of the species, it will be sufficient here to refer to the principal work on the subject, of which the title is given in the footnote below.

Nervous System.

Witnout entering upon a general description of the nervous system in Chiroptera, I purpose, under this head, to consider the chief modifications in the organs of touch and hearing which have so important relations to the systematic arrangement of the species, and which probably reach the highest development among Mammals in this Order.

In the *Rhinolophidæ*, *Nycteridæ*, and *Phyllostomidæ* peculiar foliaceous cutaneous expansions surround or extend backwards behind the nasal apertures (see Plates VI., XI., XXX.). In no other species of Mammals have analogous structures been found, and their functions and homologies appear to be imperfectly understood.

A careful investigation of the structure, relative position, mode of origin, and nervous supply of these processes leads me to believe that they are delicate organs of an exalted sense of touch, analogous to

* "The Myology of the Chiroptera." By Alexander Macalister, M.B., &c. Phil. Trans. Roy. Soc. 1872, pp. 125–171, plates 13–16.

but probably much more effective than the *vibrissæ* of other species, supplementing in the animals in which they are developed the feeble aid given by the small eyes in distinguishing objects approached in rapid flight during the hours of darkness*.

In all species of Bats with nasal appendages there may be found more or less well-developed glandular prominences on the sides of the face between the eyes and the extremity of the muzzle. In some genera they are small and concealed by the fur (as in *Vespertilio* and *Kerivoula*), in others large and nearly naked, forming prominent rounded elevations (as in *Vesperugo*, *Plecotus*, and *Synotus*), but in all long and straight fine hairs arise from them, which are evidently analogous and homologous to the *vibrissæ* of the *Felidæ* and other Mammals. In some specimens of *Plecotus auritus* these glands are found unusually large, forming rounded prominences, raised slightly above the margins of the naked crescentic depressions behind the nostrils (Plate XI. fig. 9). These prominences in *Plecotus* (*Corinorhinus*) *macrotis* are greatly developed vertically, forming high conical processes which, bending inwards over the nasal grooves, meet in the centre above and behind the nostrils, concealing the grooves beneath (Plate XI. fig. 8). In front the nasal apertures in this species are margined by a narrow, flat, cutaneous ring. In *Nyctophilus* (which is closely related to *Plecotus* and *Synotus*) the same prominent glands of the muzzle have become united in the centre above (evidence of their distinct origin being still afforded by the presence of a longitudinal furrow above), while the cutaneous marginal rings surrounding the nasal apertures in *P. macrotis* are here expanded and united together above and behind the nostrils, forming a small nose-leaf, which is supported behind by the united glandular prominences (Plate XI. fig. 7). In the much more highly differentiated nasal processes of *Megaderma*, especially of *M. spasma*, the homologies of these parts with the glandular prominences and rudimentary nose-leaf of *Nyctophilus* may be easily recognised.

This, then, is evidently the mode in which the very complicated nasal appendages of *Rhinolophus* and other genera have originated, whence it follows that they are partly composed of the marginal in-

* Bats without nasal appendages are more properly crepuscular and matutinal than nocturnal in their habits (see description of habits of *Molossus obscurus*, p. 412). The nose-leafed species fly much later, and this is probably one of the reasons why they are less commonly shot on the wing. Mr. Tomes has noted the much finer sense of touch possessed by a leaf-nosed Bat, as shown when flying in company with a simple-nosed Bat in a confined space.

tegument of the nostrils, partly of highly differentiated gland structures; and investigation of their minute structure confirms this deduction*.

In all species of leaf-nosed Bats, and especially so in the *Rhinolophidæ*, in which the nasal appendages reach their highest development, the superior maxillary division of the fifth nerve is of remarkably large calibre, as, indeed, the size of the infraorbital foramen shows. The nasal branch of this nerve, which is given off immediately beyond the infraorbital foramen, is by far the largest portion, the palpebral and labial branches consisting of a few slender nerve-fibres only. This branch passes forwards and upwards on the side of the superior maxillary bone, but soon spreads out into numerous filaments, which pass into the muscles and integument above and into the base of the nose-leaf. The nerve supply of the nose-leaf is further considerably augmented by the large nasal branch of the ophthalmic division of the fifth nerve†.

While the many foliations, elevations, and depressions which vary the form of the nose-leaf also greatly increase the sensory surface so abundantly supplied by the fifth nerve and in rapid flight intensify the vibrations conveyed to it, the great number of sweat- and oil-glands which enter into its structure perform an important function, analogous to that of the glands of the auditory canal in relation to the *membrana tympani*, in maintaining its surface in a soft and highly sensitive condition.

The nasal appendages of Chiroptera, then, may be regarded as performing the office of an organ of a very exalted sense of touch, *standing in the same relation to the nasal branches of the sensory divisions of the fifth nerve as the aural apparatus to the auditory*

* The minute anatomy of the nasal appendages of *Rhinolophus hipposideros* (as regards their cutaneous, muscular, and glandular structures) has been well worked out by Dr. Redtel (Zeitschr. für wissench. Zool. 1873, pp. 254–288, pl. xiv.), who describes the extraordinary richness of these parts in glands, which he divides into two classes—"Talgdrüsen" and "Schweissdrüsen." He hazards, however, no opinion as to their mode of origin or functions.

† In the *Rhinolophidæ* and *Nycteridæ*, owing to the position of the nasal orifices, which open so far back on the muzzle, the cup-shaped depression in which they are placed evidently corresponds to the anterior part of the nasal fossæ, which in other animals is divided by a cartilaginous septum, covered in by integument, and supplied by the nasal branch of the ophthalmic division of the fifth nerve; so that here we find this highly sensitive portion of the nose freely exposed to the air, and undoubtedly constituting, in addition to the surrounding nasal appendages, an exquisitely sensitive organ of touch.

nerve; for, as the latter organ collects the waves of sound, so the former receives impressions arising from vibrations communicated to the air by approaching objects.

But although the sense of touch in the leaf-nosed Bats must evidently be immensely increased by these nasal appendages, it should not be lost sight of that this sense is extremely acute also in species not provided with such special organs. In Spallanzani's well-known experiments, the Bats which succeeded in avoiding numerous threads hung across the rooms in which, when deprived of sight, hearing, and smell, they were permitted to fly about were not leaf-nosed species; and the unerring flight of the simple-nosed Bats of this country, even in the darkest places, has been observed by almost every one. We must therefore seek for other sensory organs which supplement the sense of vision. These undoubtedly exist in the great extent and highly sensitive condition of the integument entering into the formation of the wing-membrane and ear-conch*. In many of the species of *Vespertilionidæ* also the concave surface of the large and delicately formed ear is dotted over by numerous minute glandular elevations, from which small straight hairs, evidently analogous to the vibrissæ on the sides of the muzzle, arise (see Plate XVII. fig. 7).

In no order of Mammals is the ear-conch so greatly developed or so variable in form. In some of the species of the group *Plecoti* the length of the ear nearly equals that of the head and body, while in by far the greater number of the species of Microchiroptera the ears are as long or nearly as long as the head, and in many species they are united across the forehead. The form of the conch is very characteristic in each of the families. In *Nycteridæ*, *Vespertilionidæ*, *Emballonuridæ*, and *Phyllostomidæ* the tragus is greatly developed, forming in some species a long projection extending nearly to the outer margin of the conch, and its shape is generally characteristic in each species. Its office appears to be to cause undulations in the waves of sound, and so intensify and prolong them. It is worthy of notice that in the truly insectivorous *Rhinolophidæ*, where the tragus is not developed, the auditory *bullæ osseæ* reach their greatest size and the highly sensitive nasal appendages their highest development; also in the group *Molossi* the

* See an excellent paper on the minute anatomy of the wing-membrane in Chiroptera, by J. Schöbl, in Schultze's 'Archiv,' vii. (1871) pp. 1–31, in which the layers of integument, the hairs and their glands, the mode of termination of the nerves, &c. are carefully described.

ear-conch is divided by a prominent keel, and the antitragus is remarkably large in those species in which the tragus is minute (Plate XXI. figs. 2, 3). In the frugivorous Megachiroptera, as might be expected, the form of the ear-conch is very simple and but slightly variable in all the species, and there is no tragus. Although the frugivorous and sanguivorous species of *Phyllostomidæ* have a tragus, yet in them both it and the conch are remarkably small and very similar in form, even in species otherwise differing greatly in structure, contrasting strongly with the great development of the same parts in the insectivorous species (compare Plates XXIV. and XXX.). Widely, however, as the form of the ear-conch differs in these groups, the common origin of all is shown by the general similarity of the structure of the tragus and by the presence of a peculiar ridge of integument passing obliquely upwards and forwards from the base of its inner margin on the side of the head, which is equally developed in the long-headed *Glossophagæ* and in the short-skulled *Stenodermata*.

In all Bats the ears are extremely mobile, each moving independently at the will of the animal. This I have observed even in the frugivorous *Pteropodidæ*, in which the peculiar vibratory movements noticed by Mr. Osburn in *Artibeus perspicillatus* (see p. 520 *infrà*) may also be seen when the animals are alarmed.

Dental System.

The different forms of dentition observable in the Chiroptera will be found very fully treated of in the definitions of the families and genera and in the descriptions of the species, as in nearly all cases the dental characters afford the most reliable guides in determining their natural affinities and in their discrimination.

Of the 400 species described in the following pages, at least 300 are insectivorous, and, as might be expected from the nature of their food, their molar teeth are of the insectivorous type, being acutely tubercular, with usually well-developed W-shaped cusps. The dental formula never exceeds inc. $\frac{4}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{3-3}{3-3}$ = 38 teeth*, but is frequently less than that number, falling as low as inc. $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{0}{0}$=20 teeth in the sanguivorous group *Desmodontes*, the variability in the number of teeth in the insectivorous species being confined chiefly to the incisors and premolars,

* See footnote, p. 509, for an instance of an apparent exception to this rule.

in the frugivorous to the posterior molars (see p. 16 and footnote, also p. 512).

Among the Microchiroptera, in the family Phyllostomidæ alone is there any marked departure from the insectivorous type of dentition, and there only in the limited groups *Stenodermata* (see Plates XXVIII. and XXIX.) and *Desmodontes* (see pp. 445, 511, 545).

In the Megachiroptera, which are wholly frugivorous, the form of the teeth is remarkably similar throughout the different species, though their number is very variable. In all the species (except *Cynopterus latidens*, Plate V. fig. 3) the molar teeth are longer than broad, and their crowns are traversed by a longitudinal groove; while among the species of Microchiroptera, in *Sturnira lilium* alone are the molar teeth somewhat similarly grooved (Plate XXVIII. fig. 5).

The milk-dentition is much the same in all Bats. The teeth are very slender and with acutely pointed recurved cusps, evidently very effective in retaining a secure hold on the nipple of the mother during flight. They are soon shed, but often coexist for a short time with the permanent teeth, when the latter are considerably elevated above the gum.

Alimentary Canal.

The opening of the mouth is anterior in most species, but in many of the species of *Emballonuridæ* it resembles that of the Insectivora in being inferior, the extremity of the nose being more or less produced beyond the lower lip, so much so in *Rhynchonycteris naso* (Plate XX. fig. 4) as to resemble that of the Shrew-mice. In the *Nycteridæ*, and in the groups *Mormopes* and *Desmodontes*, the lower lip projects slightly beyond the upper. In all the insectivorous species the gape is wide, and the lips are fringed with straight hairs and very expansible, especially in the *Molossi*, in many species of which they are marked by deep vertical wrinkles (Plate XXII.). In *Chalinolobus* a small lobe projects horizontally outwards from the lower lip near the angle of the mouth, and adds considerably to its width. In the *Mormopes* the lower lip is much expanded in front and fringed with foliaceous cutaneous appendages, which probably fulfil the same functions as the nasal processes in the leaf-nosed Bats; while in the remaining species of *Phyllostomidæ* and in the *Nycteridæ* the same part is furnished with variously

shaped wart-like elevations and grooves. In the long-tongued *Glossophagæ* (Plate XXVII.) the groove in the centre of the lower lip serves as a channel for the tongue, which can be thrust out between the lower canines without necessarily opening the mouth. The form of the lips is exceedingly peculiar in *Noctilio*, and will be found described at p. 395, and figured in Plate XX.

In the Megachiroptera the form of the lips is generally less variable, but in the genus *Epomophorus* (the species of which live on juicy fruits) they are exceedingly expansible, forming deep folds and pouches especially in adult males, and in *E.* (*Hypsignathus*) *monstrosus* are most remarkably lobed in front. The nakedness of the lips and complete absence of a fringe of hairs is very characteristic of all fruit-eating Bats, and probably always distinguishes them from the insectivorous species which they may resemble in the form of their teeth and in other respects.

The inner margins of the lips in nearly all the frugivorous species, whether belonging to the suborders Megachiroptera or Microchiroptera, are fringed with numerous long conical papillæ.

In all Bats palatal ridges are more or less well-defined, but are largest in Megachiroptera, and reach their highest development in the genus *Epomophorus*, where their form and arrangement is characteristic in each species (see p. 5, and Plate II. figs. 1–6).

The œsophagus is narrow in all species, and especially so in the sanguivorous *Desmodontes*. The stomach presents two principal types of structure, which correspond respectively to the two great divisions of the order, the Megachiroptera and the Microchiroptera. In the former the pyloric portion is much produced and often folded upon itself; in the latter the same part is very short and the pyloric aperture close to the entrance of the œsophagus, the cardiac portion being expanded into a simple globular or oval sac, or greatly elongated, forming an intestiniform cæcum, as in the group *Desmodontes*.

The complex form of the stomach in the frugivorous Megachiroptera is comparable to that of the *Ruminantia*, while the insectivorous Microchiroptera resemble the *Carnivora* in the simple form of the same organ.

In *Pteropus* the œsophagus opens into a pyriform pouch, to the left of which the cardiac portion is expanded longitudinally, but is not contracted in the middle; behind, a constriction opposite the entrance of the œsophagus indicates externally the commencement of the pyloric portion, which is immensely elongated, resembling a large colon, and is folded to the left upon itself, so that externally

the pyloric extremity is placed near the œsophagus; immediately before terminating at the well-marked pylorus it forms a sacculated expansion, the rounded cæcal extremity of which lies externally across its inferior surface. In the closely allied genera *Cynopterus* and *Cynonycteris* the form of the stomach is very similar to that of *Pteropus*, the chief difference being that the cardiac portion is not distinctly separated by a notch externally, and the pyloric portion is not expanded near its termination at the pylorus. In *Cephalotes* the stomach is somewhat like *Pteropus*; the cardiac division is similarly separated, but the pyloric is very long and folded twice upon itself, and at its extremity near the pylorus is not expanded. In *Epomophorus* (the species of which live on soft fruit) and in *Harpyia* the form of the stomach is much simpler, the pyloric portion is not nearly so long nor folded upon itself, as in *Pteropus*, and the cardiac division is marked externally by a constriction on its left side. In the long-tongued *Macroglossi* the stomach varies considerably in form. In *Eonycteris* the pyloric portion is much shorter and less folded upon itself than in *Pteropus*, and on the whole resembles that of *Cynonycteris*. In *Notopteris* it is quite differently shaped, and, indeed, presents a form apparently unique. It is divisible externally into three portions—a cardiac, a central, and a pyloric. The central portion, which extends backwards behind the other two, is almost globular in form and communicates directly in front with the œsophagus, on the left with the cardiac sac, and on the right with the pyloric portion, of which the proximal half lies close to the right side of the œsophagus, almost level with the cardiac portion, and becoming bent on itself to the right terminates in the pylorus, immediately beyond which the gall-duct enters the duodenum.

In the Microchiroptera (with the exception of the group *Desmodontes*) the stomach is quite simple, and varies very slightly in the different families. In many it seems like a simple expansion on one side of the œsophagus, so closely together are the œsophageal and pyloric orifices placed. In the frugivorous species of *Artibeus* it somewhat approaches in structure some of the simpler forms met with in Megachiroptera, as in *Harpyia*, and is similarly lined with deeply reticulated mucous membrane; but the difference is still very striking. The very aberrant form of stomach in the sanguivorous *Desmodontes* is described at p. 548.

The intestinal canal varies considerably in length, but is generally three or four times the length of the head and body. It is characterised by remarkable uniformity in calibre from the pylorus to the

rectum, and by the absence of a cæcum and of valves*. A small cæcum is said to exist in *Rhinopoma*, but I have not succeeded in finding one in any of the individuals of the single species of that genus examined by me; in *Megaderma spasma*, at a distance of about three quarters of an inch from the anus, there is a small cæcum-like appendage about one tenth of an inch in length, but I have not been able to discover any opening in the intestine communicating with it.

In all species of Chiroptera the liver is remarkably large; the left lateral lobe is always well developed, and in Microchiroptera occasionally equals half the size of the whole organ. Except in the *Desmodontes*, the right and left lateral fissures are very distinct, and often extend almost to its attached border. The liver of the Megachiroptera is easily distinguished from that of the Microchiroptera by the ill-defined condition or absence of the Spigelian lobe, and, in some genera, by the remarkably large size of the caudate lobe, for in the Microchiroptera the Spigelian lobe is very large and lies in the triangular space between the œsophagus and the pyloric end of the stomach, while the caudate lobe is small, in most species forming a ridge only.

In *Pteropus* the left and right central lobes are nearly equal and are divided by a notch behind; the gall-bladder is contained in a notch in the concave upper surface of the right central lobe; the right and left lateral fissures extend almost to the attached margin of the organ; the left lateral lobe is as large as the conjoined central lobes, and greatly exceeds in superficial extent the right lateral, which is irregularly quadrilateral and thick, and its concave outer side is moulded on the right kidney; the caudate lobe is very large and tongue-shaped, and extends backwards as far as the posterior margin of the right lateral lobe, having its outer concave side applied to the inner convex surface of the kidney; the Spigelian lobe is very small and ill-defined. *Cynopterus* comes nearest to *Pteropus* in the form of the liver; but the caudate lobe is even larger, extending considerably behind the right lateral lobe, and having part of its free extremity moulded round the posterior surface of the kidney. In *Cephalotes* the caudate lobe is equally large, but the gall-bladder lies in a concavity between the right central and the

* This accounts for the rapidity with which, in the frugivorous species at least, the food eaten passes through the body, and explains how the astonishing voracity of these animals is indulged in without inconvenience. (See a note on the voracity of *Cynopterus marginatus*, p. 83.)

left lateral lobes. In *Cynonycteris* the right central lobe is much larger than the left; the gall-bladder lies in the left lateral fissure; the caudate lobe is not quarter the size of that in *Cynopterus*, and extends upon scarcely one third of the inner surface of the kidneys. In *Harpyia*, which externally appears most nearly related to *Cynopterus*, the liver differs remarkably from that of all other genera of Megachiroptera in the slight depth of its fissures: the right and left lateral fissures do not extend halfway to the attached margin, and but slightly exceed in depth the remarkably large notch between the free margins of the central lobes; the gall-bladder is contained in a concavity in the walls of the right lateral fissure, and its extremity is visible in the centre of the fissure on the convex surface of the liver; the caudate lobe is represented by a ridge-like prominence, and the right lateral lobe is considerably larger than the left, its posterior inferior free margin forming a triangular acutely pointed projection. In *Epomophorus* (*E. monstrosus* and *E. macrocephalus*) the central lobes are not divided by a notch behind, the caudate lobe is short and obtuse, and the gall-bladder lies on the concave surface of the right central lobe. In *Eonycteris* the right central lobe much exceeds the left, and the gall-bladder is lodged in a cavity in its outer side which enters the right lateral fissure; the caudate lobe is represented by a ridge only; the right lateral lobe is very large, with a deep concavity which contains half the kidney. In *Notopteris* (which presents such a very remarkable form of stomach) the liver on the whole resembles that of *Eonycteris*, but the gall-bladder hangs back freely.

The form of the liver is generally more uniform in the different species of Microchiroptera. It will therefore be sufficient to describe it in one or two characteristic genera in each family.

In *Phyllorhina commersonii* the left lateral lobe is equal to half the whole organ in size; the left central lobe is very small, and bounded behind and to the right by the right central, to the left by the left lateral; the large gall-bladder is contained in a hollow space between the adjacent edges of the central and left lateral lobes; the Spigelian lobe is distinct, free, and quadrate, but not large; caudate lobe very short. In *Nycteris* the Spigelian lobe is very long and tongue-shaped, filling up the space between the œsophagus and the pyloric extremity of the stomach. In *Nyctophilus* the Spigelian lobe is also well developed and similar in shape; the caudate lobe very short; the gall-bladder lies between the right central and the right lateral lobes. In *Miniopterus* the liver is very

deeply divided, and the posterior and right margin of the right central lobe is produced backwards as a long attenuated process; the Spigelian lobe is rather small and pointed, the caudate extends nearly to the middle of the kidney. In *Vesperugo* the Spigelian lobe is very large and leaf-like. In *Taphozous nudiventris* the left lateral lobe is also very large, the Spigelian lobe of remarkable size, and the caudate lobe is moderately developed. In *Rhynchonycteris* and in *Emballonura* the general form of the liver is similar to that of *Taphozous*, the Spigelian lobe also very large, but the caudate is indistinct. In *Molossus* the liver is generally similar to that of the preceding genera, but the caudate lobe is better defined.

In the *Phyllostomidæ* the general form of the liver does not differ much from that of the *Emballonuridæ*, except in the sanguivorous group *Desmodontes*, in which, as first pointed out by Prof. Flower, it differs not only from that of the other Bats, but also from that "of all Insectivora and Carnivora in being comparatively little divided into lobes. The umbilical fissure is distinct, but the lateral fissures are only notches in the free edge of the organ, imperfectly marking off two small and nearly equal central lobes. The left lateral lobe is large and crescentic, the right thick and rounded; but neither the Spigelian nor the caudate lobes are distinct, being only indicated by a strong ridge on the under surface of the right lateral lobe"*.

In *Carollia* the left lateral lobe is larger than half the whole organ, and its concave right margin is much overlapped by the left central; the gall-bladder lies in a hollow on the right side of the right central lobe; the Spigelian lobe is well developed and tongue-shaped; the caudate very short. In the truly frugivorous genus *Artibeus* the Spigelian lobe is remarkably small, and the caudate indistinct.

Cutaneous System.

In extent, peculiar modifications, and sensitiveness the Cutaneous System reaches its highest development in this Order. As a sensory organ its chief modifications in connection with the external ear, and with the nasal and labial appendages, have been described under the head of Nervous System. It remains therefore to consider its relative development as an organ of flight, and the position and form of the peculiar glandular structures into which it enters.

The extent and shape of the volar membranes depend mainly on the form of the bones of the anterior extremities, and on the pre-

* Medical Times and Gazette, 1872, ii. p. 60.

sence or absence of the tail. Certain modifications of these membranes, however, are met with which evidently do not depend upon the skeleton, but are related to the habits of the animals, and to the manner in which the wing is folded in repose.

The volar membranes consist of:—(1) the "antebrachial membrane," which extends from the point of the shoulder along the humerus and more or less of the forearm to the base of the thumb, the metacarpal bone of which is partially or wholly included in it; (2) the "wing-membrane," which is spread out between the greatly elongated fingers, and extends along the sides of the body to the posterior extremities, generally reaching to the feet; and (3) the "interfemoral membrane," the most variable of all, which is supported between the extremity of the body, the legs, and the calcanea. (*Vide* Plates I., VI., XIII.)

The antebrachial and wing-membranes reach their highest development in those species which are fitted only for aerial locomotion, and which when at rest hang head downwards suspended by the claws of the hind feet, with the body enveloped in the wings. We find these membranes therefore well developed in the *Pteropodidæ*, in *Nycteridæ* especially, in most species of the *Vespertilionidæ*, and in nearly all the *Phyllostomidæ* except the group *Desmodontes*. In *Emballonuridæ*, especially in the subfamily *Molossinæ* (the species of which are, of all Bats, the most fitted for terrestrial progression), the antebrachial membrane is reduced to the smallest size, and is not developed along the forearm, leaving also the thumb quite free, and the wing-membrane is very narrow and folded in repose completely under the forearm (see pp. 403, 444).

Owing to the peculiar manner in which the wing is folded in nearly all the species of *Emballonuridæ*, the margin of the membrane between the fourth and fifth fingers is deeply concave, and does not extend to the end of the terminal phalanx of the fifth finger.

In all species of Megachiroptera the wing-membrane extends to the backs of the feet, in some species to the backs of the first phalanges of the toes; whereas in Microchiroptera (with the exception of the genera *Vampyrus* and *Lophostoma*) it is attached to the sides of the legs or feet, rarely to the bases of the calcanea. In most species this membrane has its origin from the sides of the body more or less removed from the spine; but in *Notopteris* and *Cephalotes*, and in the single species *Chilonycteris* (*Pteronotus*) *davyi*, it arises from the centre line of the back, to which it is connected by a short and very slender longitudinal membranous process; and while the

back beneath is well covered with fur, the overlying wing-membrane is naked. In *Pteropus melanopogon* and its allies, and in *Vespertilio macrotarsus* and *V. pilosus*, the membranes arise near the spine.

The development of the interfemoral membrane is evidently related to the nature of the food, as it reaches its greatest size in the insectivorous, but in nearly all the frugivorous and sanguivorous species is deeply cut out behind, or forms a narrow projection along the legs. Thus it is well developed in the families *Rhinolophidæ*, *Nycteridæ*, *Vespertilionidæ*, *Emballonuridæ* (except in *Rhinopoma*, believed to be partially if not wholly frugivorous), and in the insectivorous species of *Phyllostomidæ*; while in the frugivorous and sanguivorous species of the same family, and in the Megachiroptera, it is very small or rudimentary.

In the insectivorous species it appears not only to aid their rapid doubling motions when in pursuit of their insect prey by acting as a rudder on the air (see p. 403), but also to assist them in the capture and retention of the larger insects, such as the smooth-bodied Coleoptera, as it becomes, when pressed forwards by the tail upon the abdomen, a very effective trap. Its small size in the frugivorous and sanguivorous species which do not require it, to which, indeed, its presence would be actually injurious as impeding their motions when searching for food when suspended by their feet, is easily understood. (See remarks on the interfemoral membrane of *Molossi* at p. 403, and on that of one of the frugivorous species of *Phyllostomidæ* at p. 503.)

Odoriferous glands and pouches opening on the surface of the outer skin are developed in many species, but in most cases more so in males than in females, and so constitute very remarkable secondary sexual characters. They are chiefly found in the highly organized forms, as in the larger species of Megachiroptera, in the subfamily *Phyllorhininæ* (*Rhinolophidæ*), in the groups *Vampyri* and *Stenodermata* (*Phyllostomidæ*), and in the family *Emballonuridæ*. They may be classed as:—

1. Frontal pouches (*Phyllorhina*, p. 127, Pl. IX. fig. 3).

2. Gular glands and pouches (*Taphozous*, p. 378; *Cheiromeles*, p. 405, Pl. XXI.; *Molossus*, p. 410, Pls. XXI., XXII.; *Phyllostoma*, p. 484).

3. Shoulder-pouches and glands (*Epomophorus*, p. 5, Pl. II. fig. 3; *Pteropus*, p. 16; *Cynonycteris*, p. 74).

4. Thoracic glands (*Ametrida*, p. 531, Pl. XXX. fig. 2).

5. Pubic and anal glands and follicles (*Rhinolophidæ*, p. 99; *Megaderma*, p. 154; *Noctilio*, p. 393; *Eonycteris*, p. 95).

6. Wing-pouches (*Saccopteryx*, p. 369).

The form and relative development of these structures in male and female will be found described under the head of each species in which they occur.

Among the Microchiroptera the odoriferous secretions of these glandular organs appear to act principally in bringing the sexes together in the dark retreats in which they hide, as they are always found most abundant during the rutting-season; but in the large species of Megachiroptera, as in *Pteropus*, which roost in trees exposed to the attacks of passing enemies, and in which they are also developed in the female, but to a less extent, the strong musky odour exhaled, and which fills the air in the neighbourhood of their haunts, is evidently protective. (See also my paper "On Secondary Sexual Characters in Chiroptera," P. Z. S. 1873, pp. 241–252.)

Generative Organs.

The penis is pendulous in all Bats, and in many species provided with a well-developed bone. Its form varies sometimes considerably even in species of the same genus. Thus in *Rhinolophus luctus* the glans penis is very large and cylindrical, and the urethra opens on the upper surface at a distance of more than 0·2 inch from its distal extremity, to which it extends forwards in an open groove; in most other species of the genus the urethra opens at or near the extremity of the glans; also in *Vesperugo*, in the species of the subgenus *Hesperoptenus* the form of the penis (described at p. 241) is quite different from that of other species of the genus. In *Vesperugo noctula* and in *Scotophilus pallidus* there is a long and slender bone. In *Noctilio* the glans is long and conical, and the urethra opens on its upper surface about 0·1 inch behind the conical extremity, the orifice guarded above by a small fleshy process, from which a groove runs backwards to the point of attachment of the prepuce.

In most species of Microchiroptera the prepuce projects considerably beyond the glans, and its great development in *Vesperugo abramus* is characteristic of that species (see p. 227).

In Megachiroptera, with few exceptions, the species have a broad spatulate bone in the glans penis. This is especially well developed in the genus *Pteropus*, in which it appears to form the greater part of the glans. In *Eonycteris*, although the glans seems fleshy, there is a broad bone concealed within, and the opening of the urethra is triangular. In *Harpyia* the penis bone is slender, more like that in some of the Microchiroptera.

In all species of Chiroptera the testes pass periodically into a temporary scrotum formed out of the skin of the perinæum (see Plate XIII. fig. 1).

The preputium clitoridis is long in the species of the Emballonurine alliance, and appears to reach the greatest development in *Noctilio* (see p. 393), in which it is nearly as long as the penis of the males. In the species also included in this alliance the opening of the vulvæ is longitudinal; whereas in the Vespertilionine alliance and in the Megachiroptera the vulvæ open transversely, and the preputium clitoridis is short. In *Cheiromeles torquatus* and in *Noctilio leporinus* the clitoris is perforated by the urethra.

The form of the uterus varies considerably in different genera, and even in different species of the same genus.

In Megachiroptera the uterus is deeply divided into two cornua, which extend almost to the os uteri. Externally the body of the uterus appears to be nearly as long as the cornua; but this is due to the union of the adjoining sides of the cornua forming a common septum.

In Microchiroptera the cornua are very long in many species—*Megaderma spasma* and *Phyllorhina speoris*, e. g., where the uterus externally resembles that of the Megachiroptera; but I have not found the internal septum carrying the cornua almost to the os uteri as described above, and the body of the uterus is much longer. In other species (*Scotophilus temminckii*, *Miniopterus schreibersii*, *Taphozous nudiventris*, and *Molossus abrasus*, e. g.), the body of the uterus is still longer, almost as long as the cornua. In *Corinorhinus macrotis* the uterus is club-shaped, with two broad and short horns; while in the far-removed species *Vesperugo serotinus* and *Artibeus planirostris* the uteri agree in their simple and undivided condition.

Geographical Distribution.

Although most abundant in the tropics and in the warmer parts of the temperate zones of both Hemispheres, representatives of the order are to be found in every region where flying insects abound, extending even to the confines of the Arctic Circle. No Bats have been found in Iceland, in St. Helena, in the Galapagos Archipelago*, or in Kerguelen Land, nor do they appear to inhabit any of

* In reply to my inquiries Mr. Darwin has very kindly given me the following information:—"With respect to Bats at the Galapagos, I would assuredly have recorded their presence had any been seen. Of course it does not follow from this that there are none; yet, as I never collected in any place with so few insects, it is probable the Bats are really absent."

the islands of the Low Archipelago. But they are present in most other oceanic islands of any extent; few of the islands of the Pacific west of the Low Archipelago are without some species of the frugivorous *Pteropodidæ*, even the small Savage Island, south-east of the Navigators' group, being inhabited by *Pteropus keraudrenii*.

Of the six families into which the Chiroptera are divided, two only (the *Vespertilionidæ* and *Emballonuridæ*) extend into both the Eastern and Western Hemispheres; and even of these the species of the latter family inhabiting America are quite distinct from those of the Old World, and the genera nearly so, *Nyctinomus* alone being common to both; while of the sixteen genera of *Vespertilionidæ*, two only (*Vespertilio* and *Vesperugo*) are generally distributed, and one species alone (*Vesperugo serotinus*) is certainly known to inhabit both the Old World and America *.

It is worthy of note that, of the single genus of *Emballonuridæ* which is common to both Hemispheres, four species only out of twenty-one inhabit America, and these are all closely related to one another, and very far removed from any of the Old-World species.

Of the remaining families, the *Pteropodidæ*, *Rhinolophidæ*, and *Nycteridæ* are strictly limited to the Old World, the *Phyllostomidæ* to America.

The Eastern and Western Hemispheres are therefore, on the whole, eminently distinct in their Chiropterous fauna; and it will be found, when we come to examine the distribution of the genera of each family, that each zoological region has its characteristic species also.

The *Pteropodidæ* are distributed throughout the Ethiopian, Oriental, and Australian Regions (except Tasmania and New Zealand); but of the genera one only, *Cynonycteris*, extends throughout all these Regions. *Epomophorus* is strictly limited to that part of the Ethiopian Region included within the continent of Africa. *Cynopterus* is almost limited to the Oriental Region, a single anomalous species, *C. latidens* (which differs widely from all the other species in the form of its teeth), being found in the Moluccas. *Eonycteris* is, as yet, known from the Indo-Malayan Subregion alone; *Macroglossus* has the only species of this family

* This fact has not been previously noticed. It has hitherto been generally understood among zoologists that the American species of Bats were totally distinct from those of the Old World. It is probable that *Vesperugo abramus* and *V. borealis* also extend into America (see remarks on the distribution of these species, *infrà*, pp. 193, 203, 229).

common to both the Oriental and Australian Regions; *Notopteris* appears to be limited to the Polynesian Subregion; *Harpyia* and *Cephalotes* are characteristic of the Austro-Malayan Subregion.

The distribution of the genus *Pteropus* (which includes more than half the whole number of the species of *Pteropodidæ*) is more remarkable than that of any of the other genera of Chiroptera, and is comparable only to that of the Lemurs. The Comoro Islands in the Mozambique Channel form its westward limit, thence the species extend throughout the Malagasy Subregion, even to the small hurricane-swept island of Rodriguez, and northwards through the Amirantes and Seychelle Islands to India, where their westward limit is found at the southern frontier of Baluchistan (see p. 52); from India they extend eastwards throughout the Oriental and Australian Regions (except Tasmania and New Zealand), inhabiting Polynesia as far eastwards as Samoa and Savage Island (see p. 16). Although 1000 miles of unbroken ocean divide the Seychelle Islands from the Chagos group (the nearest intermediate land to India), the Indian and Madagascar species (*Pteropus medius* and *Pt. edwardsii*) are very closely allied; while, on the other hand, not a single species crosses the narrow channel between the Great Comoro Island and the African coast.

The *Rhinolophidæ* are limited to the tropical and warmer parts of the temperate zones of the Eastern Hemisphere from Ireland to Japan, from South Africa to New Ireland and Australia. No species has as yet been recorded with certainty from any part of the Polynesian Subregion, from Tasmania, or from New Zealand. With the exception of *Rhinolophus ferrum-equinum*, which extends throughout the Ethiopian and warmer parts of the Palæarctic Regions, the species of this family inhabiting each of the zoological regions comprised within the area of its distribution are distinct and characteristic. No species of the subfamily *Phyllorhininæ* extends into the Palæarctic Region; *Cœlops* is limited to the Oriental Region, and *Rhinonycteris* to the Australian: these last two genera, however, include but a single species each. The very remarkable forms *Phyllorhina commersonii* and *Ph. cyclops* belong to the Ethiopian Region, but the former species alone extends also into the Malagasy Subregion.

The *Nycteridæ* are limited to the Ethiopian and Oriental Regions, one species only passing slightly beyond the limits of the latter Region (see p. 158), and none have as yet been found in the Malagasy Subregion of the former. The Ethiopian species of the

genus *Megaderma* are more closely related to each other than to the Oriental species. The distribution of *Nycteris* is remarkable: six species are limited to the Ethiopian Region, the seventh is found in Java, and differs from all the rest in the large size of the second lower premolar.

The general distribution of the *Vespertilionidæ* has been referred to above. Of the sixteen genera, five (*Antrozous*, *Atalapha*, *Nycticejus*, *Natalus*, and *Thyroptera*) are peculiar to America, but these represent nine species only. *Nyctophilus* and *Chalinolobus* (subgen.) are limited to the Australian Region; *Synotus*, *Otonycteris*, and *Plecotus* (subgen.) to the Palæarctic. A second species of *Plecotus* (the type of a well-defined subgenus *Corinorhinus*) is found in the Nearctic Region only. Of the fifty species of *Vesperugo*, eleven only inhabit the New World. Three species are especially remarkable for their wide distribution. *Vesperugo serotinus* extends throughout the Palæarctic, Ethiopian, and Oriental Regions, and also into the Nearctic and Neotropical Regions of the New World. Specimens of this species from Central America (see p. 193) are not distinguishable from European examples. *Vesperugo abramus* is recorded from all the zoological regions of the Eastern Hemisphere, and I have seen a specimen said to be from the Straits of Juan da Fuca, Vancouver's Island, which I believe must be referred to this species. *Miniopterus schreibersii* is widely distributed throughout all the warmer parts of the Eastern Hemisphere; adult specimens from Europe, South Africa, and Australia are not distinguishable.

Of the fourteen genera recognised, half (viz. *Furia*, *Amorphocheilus*, *Rhynchonycteris*, *Saccopteryx*, *Diclidurus*, *Noctilio*, and *Molossus*) are peculiar to the Neotropical Region. Of the remaining half, *Mystacina* is limited to New Zealand, *Colëura* to the Ethiopian Region, *Rhinopoma* to Africa and India; *Taphozous* is represented in all the warmer parts of the Eastern Hemisphere; *Emballonura* appears to be specially an insular genus, as the species extend from Madagascar to the Malay Archipelago, and throughout the larger islands of the Polynesian Subregion, though they have not been found in any of the adjacent continents; while the species of *Nyctinomus* are distributed throughout the tropical and warmer parts of the temperate zones of both Hemispheres, except New Zealand and Polynesia.

The Neotropical genera of this family are, on the whole, more closely related to each other than to any of the Old-World genera; nevertheless there are certain peculiar forms of limited distribution

in the Eastern Hemisphere which seem to have their nearest allies among Neotropical species. Thus the very remarkable species *Cheiromeles torquatus* (Plate XXI. figs. 1, 1 *a*), which has not been found beyond the Indo-Malayan Subregion, appears to be more closely related to some of the species of the Neotropical genus *Molossus* than to any of the Old-World forms; and the same remark applies to *Nyctinomus australis* (Plate XXII. fig. 9), which is characteristic of the Australian Region.

The *Phyllostomidæ* are strictly limited to the Neotropical Region, of which they are, therefore, eminently characteristic. No species, except *Trachyops cirrhosus* (which has been found in Bermuda, and is said to occur in South Carolina), extends beyond its limits. Few, if any, of the species of this family, in the present state of our knowledge, can be said to be characteristic of any of the subregions, but certain species appear to be limited in their distribution within the region. Thus, *Mormops blainvillii* is confined to the Antillean Subregion, and *Mormops megalophylla* to the Mexican and Brazilian Subregions. *Artibeus perspicillatus* inhabits the Antillean, Mexican, and Brazilian Subregions, but *Artibeus planirostris* appears to be limited to the Brazilian Subregion. *Stenoderma achradophilum* and *Stenoderma falcatum* have not yet been found beyond the Antillean Subregion, and *Desmodus rufus* and *Diphylla ecaudata* have not been recorded from it; but this may be accounted for by the absence of any of the larger warm-blooded animals on which these species prey.

Of all the families of Chiroptera the *Vespertilionidæ* have not only the widest geographical range, but also extend to higher latitudes both north and south of the Equator. The northern limit of the species appears to correspond to the isothermal of 32° or thereabouts. *Vesperugo borealis*, according to Nilsson, extends to the northern parts of the Scandinavian Peninsula, probably as far as the limit of the Arctic Circle; and Blasius observed it in Northern Russia, where it appears to occur even as far north as the neighbourhood of the White Sea. *Vesperugo* (*Lasionycteris*) *noctivagans* has been taken on the shores of James's Bay (Hudson's Bay); *Vespertilio lucifugus* has been recorded from Lake Winnepeg, and *Atalapha noveboracensis* from the Aleutian Islands; and Mr. Darwin ('Naturalist's Voyage,' p. 236) notices the presence of a Bat (probably *Vesperugo magellanicus*) on the wind-swept island of Tierra del Fuego.

The *Emballonuridæ* have the next widest northern and southern range, but they fall far short of the *Vespertilionidæ* in this respect.

Their northern limit corresponds very closely to the isothermal of 55°. A specimen of *Nyctinomus cestonii* in the British Museum is said to have been sent from Jersey; but this is not quite certain, the highest northern locality in Europe from which it has hitherto been recorded being Switzerland, and in Asia, Amoy. *Nyctinomus brasiliensis* extends to Fort Lucas in California, and to Charleston in South Carolina. In the Southern Hemisphere *Mystacina tuberculata* occurs in New Zealand.

Among the remaining families which are limited either to the Eastern or Western Hemispheres, the *Rhinolophidæ* have the highest northern and southern range, two species extending into Southern England, Northern Germany, and Japan, and southwards to the Cape of Good Hope. The *Pteropodidæ*, *Nycteridæ*, and *Phyllostomidæ* scarcely extend beyond the tropical zones in both hemispheres.

In bringing this Introduction to a close, I take the opportunity of acknowledging the very liberal manner in which I was permitted to examine the valuable collections of the Leyden, Paris, Berlin, and Stuttgart Museums, respectively under the care of Professors Schlegel, Milne-Edwards, Peters, and Krauss, to whom my especial thanks are due. At Leyden, Dr. Jentink very kindly personally assisted me when examining the unequalled collection of *Pteropodidæ*; and at Berlin I had the great advantage of seeing the many rare specimens of species described and noticed in the valuable papers published during the past twenty-four years by Prof. Peters, to whom we owe the first attempt to arrange scientifically many of the genera of Chiroptera, more especially those of the leaf-nosed Bats of both hemispheres. At Berlin also, through the great liberality of Prof. Peters, I had the privilege of inspecting the beautifully executed series of unpublished plates representing the species of Chiroptera in the collection of the Royal Zoological Museum and other rare species.

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G. E. D.

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CATALOGUE

OF

CHIROPTERA.

CHIROPTERA.

Volant mammals, having their fore limbs specially modified for flight. The forearm consists of a rudimentary ulna, a long curved radius, and a carpus of six bones supporting a thumb and four greatly elongated fingers, between which, the sides of the body, and the hinder extremities, a thin expansion of the integument (the *wing-membrane*) is spread out. The knee is directed backwards, owing to the rotation of the hind limb outwards by the wing-membrane; a peculiar elongated cartilaginous process (the *calcaneum*), rarely rudimentary or absent, arising from the inner side of the ankle-joint, is directed inwards, and supports part of the posterior margin of an accessory membrane of flight, extending from the tail or posterior extremity of the body to the hinder limbs (the *interfemoral membrane*). The mammary glands are thoracic and generally postaxillary; the uterus simple or two-

horned; and the smooth cerebral hemispheres do not extend backwards over the cerebellum.

The dental series consists of four kinds of teeth—incisors, canines, premolars, and molars; and the dental formula never exceeds,

$$\text{Inc. } \frac{4}{6},\ \text{c. } \frac{1-1}{1-1},\ \text{pm. } \frac{3-3}{3-3},\ \text{m. } \frac{3-3}{3-3},\ = 38 \text{ teeth.}$$

Suborder I. MEGACHIROPTERA.

Crowns of the molar teeth smooth, marked with a longitudinal furrow; bony palate continued behind the last molar, narrowing slowly backwards; second finger* generally terminating in a claw; sides of the ear-conch forming a complete ring at the base; pyloric extremity of the stomach elongated.

Frugivorous.

Limited to the tropical and subtropical regions of the eastern hemisphere.

Suborder II. MICROCHIROPTERA.

Crowns of the molar teeth acutely tubercular, marked by transverse furrows; bony palate narrowing abruptly, not continued laterally behind the last molar; second finger not terminated by a claw; outer and inner sides of the ear-conch commencing anteriorly from separate points of origin; stomach simple, or with the cardiac extremity more or less elongated.

Carnivorous, feeding principally upon insects; rarely frugivorous.

Inhabiting the tropical and temperate regions of both hemispheres.

* In accordance with the custom of the older zoologists and anatomists the writer has, hitherto, in his published papers, used the term "thumb" to indicate the first finger, denominating the succeeding fingers as "first," "second," "third," and "fourth" respectively. This custom he now abandons, adopting instead the terminology of most modern writers on zoology and anatomy, in which the thumb is counted as the first finger, as it has the advantage, not only of being more generally used, but also of being absolutely required when treating of the homologies of the limbs.

Suborder I. MEGACHIROPTERA.

Family PTEROPODIDÆ.

The characters of the single Family are those of the Suborder.

Synopsis of the Genera.

I. Tongue moderate; molars well developed .. *Group I. PTEROPI.*

A. Tail very short or none, when present quite free from the interfemoral membrane; second finger with a distinct claw; wings from the sides of the back; premaxillary bones united in front; fur of the nape of the neck and shoulders not differing from that of the back.
Inc. $\frac{4}{4}$ or $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{1-1}{2-2}$.... 1. EPOMOPHORUS, p. 4.

B. Tail very short or none, when present partly contained within the interfemoral membrane.

a. Second finger with a distinct claw; premaxillary bones united in front.

a'. Nostrils simple, their inner margins alone projecting.

a''. Tail none; fur of the nape of the neck and shoulders differing in colour or quality from that of the back.

a'''. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{2-2}{3-3}$. 2. PTEROPUS, p. 15.

b''. Tail distinct; fur of the nape of the neck and shoulders not differing from that of the back.

b'''. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{2-2}{3-3}$. 3. CYNONYCTERIS, p. 70.

c'''. Inc. $\frac{4}{4}$ or $\frac{4}{2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{2-2}{2-2}$ ..... 4. CYNOPTERUS, p. 80.

b'. Nostrils tubular, projecting abruptly from the muzzle; tail distinct.

a'''. Inc. $\frac{2}{0}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{2-2}{2-2}$. 5. HARPYIA, p. 88.

b. Second finger without a claw; wings from the spine; tail distinct; premaxillary bones separate in front.

c'''. Inc. $\frac{2}{2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{2-2}{3-3}$. 6. CEPHALOTES, p. 91.

II. Tongue very long, muzzle narrow, elongated; molars very narrow, scarcely raised above the gum ..... *Group II. MACROGLOSSI.*

c. Second finger without a claw; premaxillary bones separate in front.

c'. Wings from the spine; tail long.

f'''. Inc. $\frac{2-2}{1-1}$*, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{2-2}{2-2}$. 7. NOTOPTERIS, p. 92.

d'. Wings from the sides of the back; tail short.

g'''. Inc. $\frac{2-2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{2-2}{3-3}$. 8. EONYCTERIS, p. 94.

d. Second finger with a distinct claw; premaxillary bones united in front.

e'. Wings from the sides of the body.

c''. Tail short; wing-membrane from the base of the fourth toe.

h'''. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{2-2}{3-3}$ .. 9. MACROGLOSSUS, p. 95.

d''. Tail none; wing-membrane from the base of the third toe.

i'''. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{2-2}{3-3}$ .. 10. MELONYCTERIS, p. 97.

1. EPOMOPHORUS.

Epomophorus, *Bennett, Trans. Zool. Soc.* 1835, ii. p. 38; *Gray, Mag. Zool. & Bot.* ii. 1838, p. 504; *Peters, MB. Akad. Berl.* 1867, p. 869.

Head long; muzzle conical or thickened and obtuse in front; lips very expansible, more or less largely developed and pendulous in males; ears simple, separate, with (in all the known species) a tuft of white hairs near the base of the anterior margins of the ear-conch; second finger with a well-developed claw; metacarpal bone of the middle finger equal to or shorter than the second finger; wings from the sides of the hairy back and from the base or back of the second toe; tail very short, wholly separate from and inferior to the short interfemoral membrane, or altogether absent.

Dentition. Inc. $\frac{4}{4}$†, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{1-1}{2-2}$.

Upper incisors weak, unicuspidate, the outer pair often deciduous; premolars and molars feeble, narrow; first upper premolar separated by a wide space from the canine.

Skull very long and narrow; crown of the head less vaulted than in any other genus of Pteropidæ, scarcely elevated above the muzzle; cranio-facial axis horizontal; occipital crest prominent; postorbital processes of the frontals short, not half circumscribing the orbits behind; bony palate much vaulted behind, extending as far back as a point opposite the centres of the zygomatic arches; premaxillary bones united in front; all the bones very thin and translucent.

Range. That part of the Ethiopian Region included within the continent of Africa.

* Inner upper incisors rudimentary, not visible in recent specimens.

† $\frac{2}{4}$ in adult individuals of *E. comptus* only.

The Bats of this genus are easily distinguished by their remarkably large and long head, very expansible lips, and by the invariable white tuft of hair which adorns the margins of the ears in front and behind in both males and females of every known species. The males are larger than the females, and have longer and narrower heads, and in most species are provided with peculiar glandular pouches, which are situated in the integument of the side of the neck near the point of the shoulder. These pouches are rudimentary or quite absent in females. In the males they are lined with a glandular membrane, from which long coarse yellowish-white hairs arise, which project by their extremities from the mouth of the sac, and, when the pouches are everted, form conspicuous epaulet-like tufts on the shoulders. In the single species, *E. monstrosus*, in which these shoulder-pouches are not developed, the males are distinguished by most peculiar foliaceous processes of the integument of the front of the muzzle, of which rudiments only occur in the females (see Plate I. figs. 1*a* & 2).

The fur is very similar in all the species, being rather short and of a peculiar light yellowish or cinnamon-brown colour with a greyish tinge; the abdomen in many species with a large oval patch of whitish hairs, and in every species, even in the aberrant and very peculiar *E. monstrosus*, the bases of the outer and inner margins of the ear are adorned with tufts of white hairs.

The *Epomophori* live on figs, and probably on other soft fruits, the juicy contents of which their voluminous lips and capacious mouths enable them to retain and swallow without loss while the process of mastication is going on.

The different species agree so closely together in external form and in the colour of the fur that it is extremely difficult to distinguish them by characters derived from an examination of their external structure. Fortunately we have, in the form and arrangement of the palate-ridges, very reliable characters by which specimens preserved in alcohol may be at once determined, and these characters are set forth in the synoptical Table at p. 7, and illustrated by the figures on Plate II. In the case of dried skins the discrimination of the species is attended with considerable difficulty; but the form of the ears, the presence or absence of the tail, and especially the measurements of the bones of the extremities afford the most reliable characters. *E. labiatus* has been described from dried skins, and the only specimens known are skins also. It is therefore uncertain whether it is a distinct species or a small variety only of some of the larger species of the genus.

Synopsis of Subgenera.

I. Shoulder-pouches not developed in either males or females; front of the muzzle with prominent cutaneous foliaceous expansions; molars with distinct external cusps ..... HYPSIGNATHUS, p. 7.

II. Shoulder-pouches well developed in males, rudimentary or quite absent in females; lips pendulous and folded on the sides (especially in adult males), but without broad cutaneous expansions in front; molars with smooth slightly grooved crowns without cusps ..... EPOMOPHORUS, p. 7.

Subgenus HYPSIGNATHUS.

1. Epomophorus monstrosus.

Hypsignathus monstrosus, *Allen*, *Proc. Acad. Nat. Sci. Philad.* 1861, p. 156; *Peters*, *MB. Akad. Berl.* 1867, p. 870; *Gray*, *Catal. Monkeys and Fruit-eating Bats*, p. 124 (1870).
Spyrocephalus labrosus, *Murray*, *P. Z. S.* 1862, p. 8, pl. i.

Considerably larger than any other known species of the genus. Head (in adult males) very large and cylindrical, the anterior extremity of the muzzle thick and obtuse: the distance from the eye to the end of the nose slightly more than half the length of the head; on either side of the extremity of the muzzle (in adult males) a very prominent, deep, semicircular fold of integument, continuous above with the lower margin of the nostril, and below and behind with the horizontal margin of the upper lip; front margin of the upper lip papillate, fimbriated; corresponding margin of the lower lip similar, but thinner and divided by a V-shaped incision in the centre. In females the muzzle is conical and much shorter, and its upper surface scarcely elevated above the nasal apertures, the lower margins of which are connected with the sides of the lower lip by folds similar to those in the males, but very much less developed (Plate I. figs. 1, 1*a*, 2).

The palate has three undivided straight transverse ridges, whereof the first corresponds to the space between the canines and the first premolars, the second to the second premolars, the third to the molars; the fourth consists of two papillæ; the remaining ridges are indistinct, arched forwards and finely toothed (Plate II. fig. 1).

In the adult male, on either side of the neck, a strong integumentary band extends forwards from the point of origin of the antebrachial membrane to the side of the back of the head. These bands are not developed in females, and they appear to be supports to the head, which is so remarkably large in the adult male.

Ears shorter than the muzzle, triangular, attenuated in their upper third, and subacutely pointed; the usual white patch of hairs along the anterior and posterior margin of the ear-conch.

Interfemoral membrane 0″·4 deep in the middle; no trace of a tail; wings from the base of the second phalanx of the second toe.

Upper surface of the muzzle nearly naked in the male, in the female covered with very short grey hairs; fur above and beneath rather short, but dense and very soft, greyish slate-brown, paler beneath. About three fourths of the forearm is covered with short fur,

and the fur of the back extends thickly upon the interfemoral membrane, concealing its posterior margin in the centre, and the legs are clothed as far as the ankles.

Upper incisors small, in a semicircle, separated from each other and removed from the canines by a space on either side; lower incisors in pairs, separated by a slight interval in the centre; the third lower premolar and the first molar have each three cusps externally, very distinct in the first molar especially; the second and last molars have two external cusps.

The adult female differs from the male not only in the smaller and differently shaped head and in the absence of the neck-bands described above, but also in being smaller in nearly all other dimensions, as the following Table of measurements* shows:—

	Length, head.	" eye from nose.	" ear.	" forearm.	" thumb.	" 2nd finger, metacarp.	" 1st ph.	" 2nd ph.	" 4th finger, metacarp.	" 1st ph.	" 2nd ph.	" tibia.	" foot.
Adult ♂.	3·1	1·6	1·25	5·2	1·9	3·6	2·45	3·4	3·4	1·65	1·55	2·1	1·3
Adult ♀.	2·7	1·3	1·1	4·7	1·85	3·4	2·35	3·3	3·25	1·60	1·55	2·0	1·3

Hab. Western Tropical Africa (Gambia, Calabar, Gaboon).

a. ♀ ad. sk.	Gambia.	Purchased.
b. ♀ juv., al.	W. Africa.	Purchased.
c. ♂ ad., al.	Old Calabar. (Type of *Spyrocephalus labrosus*, Murray.)	A. Murray, Esq. [P.].
d. ♀ imm., al.	Neighbourhood of Cameroon Mountains.	Purchased.
e. ♀ imm., al.	Elloby District, Gaboon.	H. Ansell, Esq. [P.].

Subgenus EPOMOPHORUS.

Synopsis of the Species.

A. With transverse palate-ridges in front. (Large *Epomophori*.)

a. Palate-ridges very prominent, no semicircular toothed ridges behind; tail very small but distinct.

a'. Muzzle very long and slender; the fifth palate-ridge divided, with a lozenge-shaped cell in the centre ..... 1. *E. macrocephalus*, p. 8.

* The measurements in all cases are in inches and decimal parts of an inch.

b'. Muzzle shorter and broader, the fifth palate-ridge simple, divided in the centre by a narrow incisor ..... 2. *E. gambianus*, p. 10.

b. Palate-ridges less prominent, with semicircular toothed ridges behind; no tail externally.

c'. Muzzle shorter than in *E. gambianus*; the third palate-ridge developed on the sides only ..... 3. *E. franqueti*, p. 12.

d'. Muzzle short; the third palate-ridge complete, undivided; upper incisors (in adults) two only ..... 4. *E. comptus*, p. 13.

B. No transverse palate-ridges. (Small *Epomophori*.)

e'. Muzzle much shorter and comparatively broader than in any of the preceding species; palate with a longitudinal Y-shaped groove ..... 5. *E. pusillus*, p. 14.

Two other species have been recognised, *Epomophorus wahlbergii*, Sundevall, and *E. labiatus*, Temminck (see p. 11). The former appears to me to differ only from *E. gambianus* in the greater hairiness of the extremities; the latter seems to be distinguished chiefly by its smaller size. Both are represented as yet by dried skins only, so that an examination of their palate-ridges is impossible.

2. Epomophorus macrocephalus.

Pteropus macrocephalus, *Ogilby*, *P. Z. S.* 1835, p. 101; *Wagner*, *Suppl. Schreb. Säugeth.* ~~ii~~ p. 367 (1844).

Pteropus megacephalus, *Swainson*, *Nat. Hist. and Class. Quadrup.* p. 92 (1835).

Pteropus epomophorus, *Bennett*, *P. Z. S.* 1835, p. 149.

Epomophorus whitei, *Bennett*, *Trans. Zool. Soc.* 1835, vol. ii. p. 38, pl. 6.

Epomophorus macrocephalus, *Tomes*, *P. Z. S.* 1860, p. 50, 1861, p. 11, figs. 1, 1 *a*; *Peters*, *MB. Akad. Berl.* 1867, p. 869.

Head very long and narrow; muzzle nearly half its length, much longer than the ear; the eye is less than half the distance from the ear that it is from the end of the muzzle; nostrils rather prominent and diverging, opening laterally with a wide emargination between; the upper lip rounded in front, divided *inferiorly* by a narrow shallow groove, which is not continuous with the emargination between the nostrils above; sides of the lip much expanded and folded in old males, with a prominent fleshy glandular (?) cushion on each side, half internal, near the angle of the mouth. Ears simple, oval, much longer than broad, rounded off above, the inner margin convex to the tip, the outer margin similarly convex in lower two thirds, flattened or slightly concave in upper third.

Shoulder-pouches large, well developed in adult males, rudimentary in females and in young males.

Wing-membrane from the middle of the back of the first phalanx of the second toe; interfemoral membrane very narrow in the

centre; tail ...ole, quite free from the interfemoral membrane ...y the surrounding fur.

Above ... ...wn, with a slightly greyish tinge; paler beneath; ... ...en pale yellowish white; a tuft of white hairs along the ...nird of the outer and inner margins of the ear.

Fur short, extending upon the humerus and fleshy part of the forearm and upon the adjoining wing-membrane, but the antebrachial membrane is nearly naked; the greater part of the interfemoral is covered with short fur, which also extends along the legs to the back of the feet, and short hairs are thinly spread over a large part of the wing-membrane between the humerus and the leg.

Roof of the mouth much vaulted, especially posteriorly, with six very prominent palate-ridges, which are characteristic of the species: the first is straight, and is placed across the palate slightly behind the canines; the second is slightly arched forwards, and corresponds to the first upper premolar; the third is close to the second, is more arched, and commences opposite the second premolar, or opposite the space between the first and second; the fourth is separated by a greater interval, and corresponds to the molar teeth, though it does not extend as far as their bases laterally; the fifth is placed at a still greater distance behind, and is very peculiarly shaped, being rhomboidal, hollowed out in the centre, and divided into two lateral triangular halves by a narrow groove; the sixth ridge is simple, divided in the centre, and placed at an equal distance behind (Plate II. fig. 2).

The head is much shorter in females, which are also slightly smaller than the males in most measurements. In young males the head is also longer than in young females of the same age, though not in so marked a degree. In the following Table of comparative measurements these differences are shown:—

	Length, head and body.	head.	ear.	eye from nose.	forearm.	second finger.	fourth finger.	tibia.	foot.
		"	"	"	"	"	"	"	"
Adult ♂.	6·3	2·6	0·9	1·2	3·5	5·9	4·5	1·3	0·85
Adult ♀.	5·0	2·3	0·9	1·0	3·3	5·7	4·3	1·25	0·85
Immat. ♂.	...	1·9	0·8	0·8	2·8	...	...	0·95	0·85
Immat. ♀.	3·8	1·65	0·8	0·65	2·8	4·7	3·65	1·05	0·85

Hab. West Africa (Gambia, Guinea, Lagos).

E. macrocephalus may be at once distinguished by the very long and narrow muzzle, nearly half the length of the whole head, and by the peculiar form of the fifth palate-ridge.

a–d. ♂ ad. sks.	Gambia.	
e, f. ♂ & ♀ ad., al.	West Africa.	Mr. Argent's collection.
g. ♂ ad., al.	West Africa.	

3. Epomophorus gambianus.

Pteropus gambianus, *Ogilby, P. Z. S.* 1835, p. 100.
? Pteropus wahlbergii, *Sundevall, Öfv. Vet. Akad. Stockh.* 1846, p. 118.
Epomophorus crypturus, *Peters, Reise nach Mossambique, Säugeth.* p. 26, pl. v. & pl. xiii. figs. 1–6.

Head very long, nearly as long as in *E. macrocephalus*, but broader, and the length of the muzzle is comparatively less. Lips very pendulous, with remarkably large cheek-pouches in adult males (Plate II. fig. 3). Ears oval, nearly as long as the muzzle (in the ♂); outer and inner margin of the ear-conch almost equally convex. Nostrils simple, their inner margins projecting slightly in front, separated by a deep emargination, which also divides the upper lip in front.

Shoulder-glands large, well developed in adult males, rudimentary in females and in young males.

Wing-membrane, interfemoral membrane, and tail as in *E. macrocephalus*.

Above yellowish brown, paler beneath; the abdomen in adult males with greyish oval patch.

Fur of the back moderately long and dense, covering the short interfemoral membrane behind and the wing-membrane along the sides of the body, extending also thickly upon the fleshy part of the forearms, and upon the legs to the backs of the feet.

Roof of the mouth much vaulted, as in *E. macrocephalus*, but wider. Palate-ridges six, straight, very prominent: the first is placed slightly behind the canines, and has a slightly triangular projection in the centre of its posterior margin; the second and third ridges are simple, undivided, and close together, the furrow between them corresponds to a line drawn between the first premolars; the fourth is opposite the first molar, and is half divided by a small incision in the centre; the fifth corresponds to the second or last molars, and is divided by a narrow incision in the centre into two half-ridges; the sixth is behind the tooth-row at a considerable distance, and is similarly divided (Plate II. fig. 3 *a*).

The muzzle is much shorter in females, which are also (as in *E. macrocephalus*) slightly smaller than the males in most measurements. In the following Table of comparative measurements, the sizes of an adult male and female are contrasted :—

Epomophorus gambianus.	Ad. ♂.	Ad. ♀.
Length, head and body	5·8	5·5
,, head	2·4	2·0
,, eye from tip of nostril	1·0	0·7
,, ear	0·95	0·85
,, forearm	3·4	3·3
,, thumb	1·55	1·4
,, third finger, metacarpal	2·35	2·25
,, ,, ,, 1st ph.	1·5	1·5
,, ,, ,, 2nd ph.	2·2	2·25
,, fifth finger, metacarpal	2·25	2·15
,, ,, ,, 1st ph.	1·1	1·2
,, ,, ,, 2nd ph.	1·1	1·15
,, tibia	1·4	1·2
,, foot	0·8	0·7

Hab. Equatorial and Southern Africa, extending even as far south as Port Elizabeth.

Specimens from the southern extremity of the African continent have their extremities more densely clothed with hair. *Epomophorus wahlbergii*, Sundevall, was founded on an example from Natal, which appears to differ from *E. gambianus* only in the greater hairiness of the legs. *E. crypturus*, Peters, was described from a female specimen, probably not full-grown, which, to judge from the description of the palate-ridges, appears to be identical with this species.

A specimen of an apparently immature male (to judge from the condition of the extremities of the finger-bones) from Benguela (marked "*d*" in the collection) is even slightly larger than the adult specimens from which the above measurements were taken, and the shoulder-pouches are not well developed.

a. imm. sk.	Gambia.	
b. ♀ ad., al.	Gaboon.	H. Ansell, Esq. [P.].
c. ♀ imm., al.	Benguela, Angola.	F. F. Monteiro, Esq. [P.].
d. ♂ imm., al.	Benguela, Angola.	F. F. Monteiro, Esq. [P.].
e. ♂ ad., al.	Angola.	
f. ♀ juv., al.	Angola.	
g, *h*. ♂ ad., al.	Shupanga, Zambesi.	Dr. Kirk [C.].
i. ♀ imm., al.	Dar-es-Salanus.	Dr. Kirk [C.].
j, *k*. ♂ & ♀ sks.	Port Elizabeth.	
l. ad. sk.		
m, *n*. skulls of *j*, *k*.		

3*a*. Epomophorus labiatus.

Pteropus labiatus, *Temminck, Monogr. Mammal.* ii. p. 83, pl. 39 (1835–41); *Wagner, Suppl. Schreb. Säugeth.* i. p. 356 (1844), v. p. 608.

Pachysoma labiatum, *Temminck, Esquiss. Zool. sur la côte de Guiné*, p. 68.

Pteropus schoënsis, *Rüppell, Mus. Senckenb.* iii. p. 131 (vide *Peters, MB. Akad. Berl.* 1867, p. 869).

Epomophorus labiatus, *Tomes, P. Z. S.* 1861, p. 11; *Peters, l. c.*

Epomophorus anurus, *Heuglin, Nova Acta Acad. Carol. Leop. Nat.-Cur.* xxiii. p. 12 (1864).

The type of *E. labiatus* in the Leyden Museum appears to me to be an example of an immature individual of a small variety of *E. gambianus*. No trace of palate-ridges exist in the dried stuffed skin, so that it is difficult to determine its relationship to *E. gambianus* with certainty. In the colour and distribution of the fur, in the form of the ears, and in the relative length of the bones of the extremities it agrees closely with that species.

The following are the measurements of the type:—

Length, head 1″·7, ear 0″·72, eye from nostril 0″·75, forearm 2″·6, thumb 1″·2; third finger—metacarp. 1″·8, 1st ph. 1″·1, 2nd ph. 1″·6; fifth finger—metacarp. 1″·7, 1st ph. 0″·8, 2nd ph. 0″·8; tibia 1″·1, foot 0″·65.

Two skulls in the collection from Abyssinia and a skin evidently belong to this form; one of the skulls affords the following measurements:—

Extreme length 1″·8, breadth across zygomatic arches 1″·0; from supraorbital foramen to end of nasals 0″·9; length of bony palate 0″·95, width of same 0″·5.

Hab. Abyssinia, Shoa.

a. ♀ ad. sk.	Abyssinia.	Purchased.
b. skull of *a*.		
c. skull of specimen from same locality.		

4. Epomophorus franqueti.

Epomophorus franqueti, *Tomes, P. Z. S.* 1860, p. 54, pl. 75.
Epomops franqueti, *Gray, Catal. Monkeys and Fruit-eating Bats*, p. 126 (1870).

Muzzle shorter than in *E. gambianus*, but, as in that species, longer in the male than in the female; ears as long as the muzzle (in the adult male); ear-conch rounded off above, the upper third of the outer margin faintly concave; nostrils separated by a rather wide and shallow emargination, which is continued downwards as a small shallow groove dividing the upper lip in front; shoulder-glands in the male large, with very long yellowish-white hairs projecting to a considerable distance, in the female quite absent; sides of the lips expansible, but not to such an extent as in *E. gambianus*.

Wing-membrane from the middle of the back of the first phalanx of the second toe; interfemoral membrane wider in the centre than in other species; no trace of a tail.

Above, cinnamon-brown; beneath, similar, but paler, and the abdomen has a very distinct oval patch of whitish hairs in the centre. The fur extends outwards upon the membranes almost as far as a line drawn from the middle of the humerus to the knee, covers the interfemoral between the thigh to its posterior margin, and passes downwards thinly upon the legs.

The palate-ridges are peculiar, but less developed than in any other known species of the genus. The first two only are prominent and undivided; the remaining ridges are represented by small oval

elevations on each side and by ill-defined semicircular toothed lines, as in *Cynonycteris straminea*. The first undivided ridge is straight, and is placed immediately behind the canines; the second is similar, and corresponds to the first premolars; the third is represented by a large oval papilla on each side, opposite the middle back tooth; the fourth, fifth, and sixth by similar but much smaller and less elevated papillæ, succeeded by transverse semicircular toothed lines behind (Plate II. fig. 4).

Upper incisors small, equally distant, *the outer incisor on each side falling out in old individuals*, so that the dentition then resembles that of *E. comptus*; lower incisors also small and separated, unequally trifid; premolars and molars as in *E. gambianus*.

The adult female is considerably smaller than the male; and the following Table exhibits the relative proportions of an adult male and female respectively:—

Epomophorus franqueti.	Adult ♂.	Adult ♀.
Length, head and body	6·2	5·8
„ head	2·25	2·15
„ eye from tip of nostril	1·0	0·85
„ ear	1·0	0·95
„ forearm	3·7	3·35
„ thumb	1·55	1·5
„ third finger, metacarpal	2·7	2·5
„ „ „ 1st ph.	1·75	1·6
„ „ „ 2nd ph.	2·55	2·2
„ fifth finger, metacarpal	2·55	2·45
„ „ „ 1st ph.	1·25	1·2
„ „ „ 2nd ph.	1·3	1·2
„ tibia	1·5	1·4
„ foot	0·9	0·9

Hab. West Africa (Sierra Leone, Gold Coast, Lagos, Gaboon).

This species is easily recognised by the very large size of the shoulder-pouches and remarkable development of the hairs lining them (in the adult male), as well as by the comparatively wide interfemoral membrane, by the total absence of the tail, by the deciduous upper outer incisors, and by the peculiar form of the palate-ridges.

a. ♀ ad., al.	Sierra Leone.	Purchased.
b. ♂ ad., al.	Gaboon.	
c. ♀ imm., al.		M. Lidth de Jeude.

5. Epomophorus comptus.

Epomophorus comptus, *Allen, Pr. Ac. Nat. Sci. Philad.* 1861, p. 158.

Muzzle shorter than in *E. gambianus*; in adult females the ear is considerably longer than the muzzle; outer and inner margins of the ear-conch equally convex in lower two thirds, the tip narrowly rounded off, the upper third of the outer margin slightly concave

beneath the tip; nostrils opening laterally, separated by a wide and shallow emargination; upper lip with a slight vertical groove.

Wings from the distal extremity of the first phalanx of the second toe. Interfemoral membrane as in *E. gambianus*; no trace of a tail externally.

Fur (so far as can be determined from an inspection of specimens preserved in alcohol) somewhat similar in colour and distribution to that of *E. gambianus*.

The palate has three straight undivided ridges in front, and four or five ill-defined semicircular toothed ridges (as in *Cynonycteris straminea*) behind; the first undivided ridge is placed slightly behind the canines, the second between the single pair of upper premolars; the third between the first upper molars; while the first semicircular ridge is divided, and corresponds to the last upper molars (Plate II. fig. 5).

Upper incisors, consisting (in the adult animal) of a single unicuspidate pair only, placed in the centre of the premaxilla (Plate II. fig. 5), and separated from each other by a slight interval (immature individuals have small outer incisors placed near the larger inner pair); lower incisors nearly equal in size, forming a straight row across, the outer incisors equally bifid, the middle pair unequally bifid, their outer cusps shortest.

Length (of an adult ♀) about 5″·0, head 1″·9, eye from tip of nostril 0″·7, ear 0″·95, forearm 3″·4, thumb 1″·45; third finger—metacarp. 2″·35, 1st ph. 1″·55, 2nd ph. 2″·4; fifth finger—metacarp. 2″·3, 1st ph. 1″·2, 2nd ph. 1″·2: tibia 1″·3, foot 0″·8.

Hab. West Africa (Lagos, Gaboon).

This species is undoubtedly closely allied to *E. franqueti*, with which it agrees generally in structure, but is distinguished by the presence of a single pair of upper incisors in the adult animal (in *E. franqueti* the outer incisors are wanting in very old individuals only), by the form of the palate-ridges, and by the mode of attachment of the wings to the toes.

Males of this species have probably shoulder-glands similar to those of *E. franqueti*, to which it is most closely related; but I am unable to describe them, as I have not yet had an opportunity of examining a male specimen.

a. ♀ ad. sk., al. Elloby District, Gaboon. H. Ansell, Esq. [P.].

6. Epomophorus pusillus.

Epomophorus schoensis, *Tomes, P. Z. S.* 1860, p. 56, 1861, p. 12, figs. 4, 4*a*.
Epomophorus pusillus, *Peters, MB. Akad. Berl.* 1867, p. 870.

Much smaller than any other known species of the genus; the length of the forearm scarcely more than half the length of that of *E. macrocephalus*.

Muzzle rather short, the eye (in the adult female) placed almost midway between the ear and the end of the nose; ears nearly

double the length of the muzzle, shaped as in *E. gambianus*; nostrils rather widely separated, the shallow emargination between them continuous with a groove dividing the lower lip; lips thickened near the extremity of the muzzle and folded near the angle of the mouth.

Wings from the base of the second toe; tail extremely short and thin*.

Fur yellowish brown above; beneath, paler brown, the extremities of the hairs greyish. The wing-membrane is covered almost as far outwards as a line drawn from the elbow to the knee, also the humerus and three fourths the forearm and the legs as far as the ankles; the feet are naked.

The palate is very peculiarly marked, and quite on a different plan from that of any other species of the genus. A broad but shallow Y-shaped groove is formed by the union of two grooves, each commencing opposite the single premolar on each side, and uniting in the centre and continued backwards as a single central groove which terminates in the vaulted roof of the palate behind. (Plate II. fig. 6.)

Length (of an adult ♀), head and body 2″·3, head 1″·2, eye from tip of nostril 0″·45, ear 0″·6, forearm 2″·0, thumb 0″·85; third finger—metacarp. 1″·35, 1st ph. 1″·0, 2nd ph. 1″·25; fifth finger—metacarp. 1″·25, 1st ph. 0″·65, 2nd ph. 0″·7; tibia 0″·85, foot 0″·55.

Hab. West Africa (Yoruba, Gambia, Lagos, Gaboon).

This and the preceding species approach the species of *Cynonycteris* and *Cynopterus* more closely than others in the shape of the head; indeed, dried skins appear at first sight to belong to species of these genera.

a, *b*.	♀ imm. & ad. sks.	Abeokuta, Yoruba.	F. Nicholson, Esq. [P.].
c.	♀ ad., al.	Lagos.	Purchased.
d.	♀ imm., al.	Gaboon.	H. Ansell, Esq. [P.].

2. PTEROPUS.

Pteropus, *Brisson, Quadrup.* p. 153 (1756); *Geoffroy, Ann. du Muséum*, xv. p. 90 (1810); *Illiger, Prodr. Syst. Mammal.* p. 118 (1811); *Peters, MB. Akad. Berl.* 1867, p. 321; *Dobson, Journ. Asiat. Soc. Beng.* 1873, p. 196; *Monogr. Asiat. Chiropt.* p. 15 (1876).

Pteropus *et* Spectrum, *Gray, Catal. Monkeys & Fruit-eating Bats*, pp. 100, 102 (1870).

Muzzle long, narrow, and cylindrical; nostrils projecting by their inner margins, the extremity of the muzzle deeply emarginate between them; upper lip with a vertical groove in front, bounded laterally by rounded naked ridges; second finger with a distinct claw; metacarpal bone of the middle finger shorter than the second

* Hitherto I have found no male of this species among the different specimens examined by me, and consequently I am unable to state whether shoulder-pouches exist or not.

finger; wing-membrane attached to the back of the first phalanx of the second toe; tail none; interfemoral membrane deeply emarginate behind, in some species scarcely developed in the centre: penis with a distinct bone.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{2-2}{3-3}$ *.

Upper incisors in a semicircular row, in a plane anterior to and separated on each side from the canines; lower outer incisors close to the canines, the inner pair generally separated by a slight interval and smaller; first upper premolars generally very small and deciduous (larger than the middle lower incisors in *Pt. leucopterus* and *Pt. molossinus* only).

Skull elongated, the cranio-facial axis almost in the same right line, the brain-case but slightly vaulted and raised above the face-line, with (in most species) a prominent sagittal crest; facial portion compressed; cerebral cavity contracted in front; frontals small, with long postorbital processes, the bases of which are pierced by a foramen; premaxillaries small, close together in front; bony palate produced backwards behind the last molar almost as far as the middle of the zygomatic arches; basioccipital wide between the auditory *bullæ osseæ*; paroccipital processes long.

Range. From the Comoro Islands in the Mozambique Channel to the Navigators' Islands in the Pacific Ocean, extending throughout the Malagasy Subregion, the Oriental Region †, and the Australian Region (except the Sandwich Islands, Ellice's group, Gilbert's group, Tokelau, the Low Archipelago, and New Zealand).

Pt. edwardsii is found abundant in Madagascar, in the Seychelle Islands, and in the Comoro Islands (the latter are scarcely 200 miles distant from the African coast), and yet not a single species of this genus has been discovered in Africa (see remarks on the distribution of the genus *Pteropus* in the Introduction).

This genus includes the largest known species of Bats. In one of the species, at least, the body attains a length of 12 inches, the forearm of nearly 9 inches, and the outstretched wings measure about 5 feet across. They are the only Bats in which the fur of the back of the neck and shoulders differs conspicuously in colour and quality from that of the back. In most of the species, also, a more or less conspicuous tuft of thickened unctuous reddish-yellow hairs (generally about half an inch in diameter) exists on either side of the neck near the point of origin of the antebrachial membrane,

* In a specimen of *Pteropus medius* from Nipal (in the collection) an additional last upper molar exists on both sides, so that the number of back teeth is $\frac{6-6}{6-6}$. As the number of true molars never exceeds $\frac{3-3}{3-3}$ in any other genus of Chiroptera, it appears evident that the three anterior teeth in each side of the upper jaw in *Pteropus* should be considered premolars, in which case the normal number of true molars would be $\frac{2-2}{3-3}$.

† *Pteropus pselaphon* is found in Bonin Island, and *Pt. dasymallus* inhabits Southern Japan (Kiousiou Island), which has been included doubtfully by Mr. Wallace in the Palæarctic Region, and most probably really belongs to the Oriental Region.

more developed in the male than in the female, and corresponding to the position of glands beneath. These glands secrete an oily substance on which the peculiar musky odour of the animals depends, and which is remarkably abundant during the breeding-season.

The fur of the adult male, especially that covering the back of the head and neck, appears to be always more brightly coloured, and the differently coloured portions of the fur contrast much more strongly together than in the female of the same age*. But although the colour of the tippet in the female is darker or less brilliantly coloured than that of the male, it is rarely as dark as that of the fur of the back; and this difference in colour between the fur of the neck and that of the back is, perhaps, due to "protective mimicry"†.

The teeth of all the species agree in number and in general characters, but differ remarkably in certain species in relative development. In most instances the premolars and molars are narrow, with an external and internal cusp separated by a longitudinal groove, which soon disappears with age (in some cases even before the animal has attained maturity) by the internal cusp becoming worn down. In *Pt. leucopterus*, *Pt. aneiteanus*, *Pt. molossinus*, and *Pt. jubatus* the premolars and molars reach their greatest development, in the first-named in general size, in the other three species in the presence of additional basal cusps and ridges; while in *Pt. scapulatus* and *Pt. macrotis* these teeth are reduced to the smallest size known in the genus, so that they resemble closely those of the genus *Macroglossus*. Such differences in the development of the teeth are evidently due to corresponding differences in the nature of the food; for we find the molar teeth reduced to the most rudimentary condition in those species of the family which are known to feed on pulpy fruits, such as the long-tongued *Macroglossi*; these, it may be remarked, are inhabitants of the tropical parts especially of the regions through which the Pteropodidæ are distributed, where soft

* See the remarks on this in the writer's paper, "On Secondary Sexual Characters in the Chiroptera," P. Z. S. 1873, p. 241.

† At first sight it might appear that this remarkable contrast of colours would render the animal more conspicuous to passing enemies, and, consequently, more subject to their attacks when hanging in an exposed position, as, for example, from the branches of a lofty tree. But any one who has seen a colony of these Bats suspended from the branches of a banyan tree or from a silk-cotton tree, must have been struck with their resemblance to large ripe fruits; and this is especially noticeable when they hang in clusters from the leaf-stalks of the cocoanut-palm, where they may be easily mistaken for a bunch of ripe cocoanuts. Hanging close together, each with his head bent forwards on the chest, his body wrapped up in the ample folds of the large wings, and the back turned outwards, the brightly-coloured neck and head are presented to the view and resemble the extremity of a ripe cocoanut, with which the larger species of this genus closely correspond in size.

It is worthy of note that this remarkable contrast in colour between the fur of the neck and back is much less developed in the smaller species of the genus, and not at all in the comparatively much smaller species of the other genera of this family, which, by their small size, are less easily seen, and are enabled to hide themselves in places inaccessible to the larger species.

fruits are always obtainable; and there are also found the largest species of the genus, while the smallest, and those provided with long woolly hairs extending thickly upon the extremities appear to be confined to the small wind-swept oceanic islands situated towards the extreme northern or southern limit of the distribution of the family.

So large are the number of species of this genus, and so closely are they related to one another by different characters, that it is extremely difficult to arrange them according to their natural affinities or to divide the genus into sections. At first sight it might appear possible to divide them according to the quality and distribution of the fur, or by the form of the skull and teeth; but the occurrence of such forms as *Pteropus molossinus*, which has the quality of fur and ears characteristic of one section, the distribution of fur of another, and the teeth of a third, or of *Pt. poliocephalus*, which resembles one group of species in the quality and distribution of the fur, while it agrees with a very different section in the development of the ears and teeth, renders a natural arrangement of the species in a linear series quite impossible.

The following Synopsis must therefore be considered chiefly as an index to the species, the position of each species with regard to the others not necessarily indicating its special affinities, which are pointed out in the general description.

Synopsis of the Species.

a. Fur soft and woolly; ears generally shorter than the muzzle, more or less concealed by the long fur.

a'. Legs densely clothed as far as the ankles or backs of the feet with erect woolly hair (naked in *Pt. molossinus* only).

a''. Fur of the back nearly as long as that of the neck; ears shorter than the muzzle.

a'''. First upper premolar very small or deciduous; premolars and molars without prominent cusps.

*a*⁴. Ears very short, clothed with long hairs, and concealed by the long fur of the head; legs clothed above and beneath.

1. Larger: forearm 6″·2; ears narrow, acutely pointed ..... *Pt. vulgaris*, p. 23.
2. Smaller: forearm 3″·7; ears shorter, obtuse; fur exceedingly fine and soft. *Pt. rubricollis*, [p. 24.

*b*⁴. Ears longer, half clothed, projecting slightly beyond the fur of the head; legs half naked beneath.

*b*⁵. Legs clothed as far as the ankles.

3. Collar not well defined, passing gradually into the light-coloured fur of the back ..... *Pt. dasymallus*, [p. 25.
4. Collar very distinct, bright yellow or yellowish white ..... *Pt. formosus*, p. 26.

c^3. Legs clothed to the base of the claws.

5. Collar scarcely distinguishable by colour from the fur of the back; forearm 5″ ..... *Pt. pselaphon*, [p. 26.

6. Collar pale yellowish white above, very distinct; forearm 6″·4 ..... *Pt. vetulus*, p. 27.

b'''. First upper premolar persistent, as large as one of the inner lower incisors; molars acutely tubercular; third lower premolar with an antero-internal broad projection.

c^4. Ears slightly shorter than the muzzle, nearly naked; legs clothed to the ankles.

7. Collar bright reddish brown, shoulders pale yellow; forearm 4″·5..... .... *Pt. aniteanus*, [p. 29.

c'''. First upper premolar persistent, as large as (or larger than) one of the lower outer incisors; second lower premolar with an antero-internal basal projection.

d^1. Ears scarcely longer than the fur of the head, nearly naked; legs naked.

8. Collar scarcely distinguishable by colour from the fur of the back; shoulder-glands with tufts of bright yellow hairs; forearm 3″·5..... *Pt. molossinus*, [p. 30.

b''. Fur of the back slightly appressed, unlike that of the neck; ears as long or longer than the muzzle.

d''. First upper premolar small or deciduous; molars rather narrow.

9. Ears much longer than the muzzle, attenuated above and pointed; legs clothed above and beneath; forearm 6″·2 ..... *Pt. poliocephalus*, [p. 31.

e'''. First upper premolar persistent, nearly equal to one of the upper incisors in cross-section; molars very broad and strong.

10. Ears as long as the muzzle, obtusely pointed; legs clothed, above, as far as the ankles; fur and membranes very pale-coloured; forearm 6″ ..... *Pt. leucopterus*, [p. 32.

b. Fur straight, rarely woolly on the legs; ears generally as long or longer than the muzzle.

b'. No premolar or molar with an anterior basal projection.

b''. First upper premolar persistent, as large as one of the lower incisors.

b'''. Fur of the back appressed, on the interfemoral and legs erect, woolly.

11. Ears shorter than the muzzle; the last upper molar as large as one of the lower outer incisors; fur ferruginous brown; forearm 5″·3..... *Pt. rayneri*, p. 33.

12. Ears slightly longer than the muzzle; the last upper molar very small, scarcely as large as one of the lower inner incisors; fur yellowish brown; foream 4″·5 .... *Pt. lombocensis*, [p. 34.

c'. First upper premolar minute, generally deciduous.

c''. Fur of the back straight, directed backwards,

scarcely appressed, on the interfemoral and legs similar.

c^4. Wings from the sides of the back; general colour of the fur and membranes brown.

13. Ears shorter than the muzzle; the concave surface of the conch thinly clothed with short hairs; tibia covered almost to the ankles; premolars and molars with posterior basal projections; forearm 5". *Pt. samoensis,* [p. 35.

14. Ears slightly longer than the muzzle, the concave surface of the conch nearly covered with soft fur, tibiæ half-clothed; premolars and molars with posterior basal projections; forearm 4"·9 ..... *Pt. rodricensis,* [p. 36.

15. Ears scarcely as long as the muzzle, naked; tibiæ clothed almost to the ankles; premolars and molars without basal projections; forearm 4"·5..... *Pt. brunneus,* p. 37.

d^4. Wings from the back near the spine; fur pale-coloured, silky, generally with more or less distinct facial streaks; legs clothed to the ankles.

d^3. With distinct facial streaks.

a. Facial streaks black or dark brown.

16. Muzzle half surrounded by a black streak behind the eyes; forearm 3"·6 ..... *Pt. personatus,* [p. 38.

17. Muzzle completely surrounded by a black streak behind the eyes; forearm 4"·4 ..... *Pt. capistratus,* [p. 39.

β. Facial streaks white.

18..... *Pt. wallacei,* p. 40.

γ. No distinct facial streaks.

19. Ears as long as the muzzle; forearm 4" ..... *Pt. temminckii,* [p. 40.

d'''. Fur of the back short, closely appressed (in adults); tibiæ naked or very thinly clothed with a few scattered hairs.

e^4. Molars very narrow, but slightly raised above the gum; first upper premolar minute, persistent.

20. Ears slightly longer than the muzzle; molars exceedingly narrow; forearm 5"·4 *Pt. scapulatus,* [p. 41.

21. Ears much longer than the muzzle; molars larger; forearm 5"·4 ..... *Pt. macrotis,* p. 42.

f^4. Molars well developed; first upper premolar minute, generally deciduous.

f^3. Wings from the back close to the spine; back generally clothed by a narrow longitudinal line of short fur, or quite naked.

f^2. Interfemoral membrane very narrow in the centre, concealed by the fur.

a. Ears not longer than the muzzle, obtuse.

22. Smaller: forearm 4"·5; membranes pale brown ..... *Pt. griseus,* p. 44.

23. Larger: forearm 7"; membranes black..... *Pt. melanopogon,* [p. 44.

g^6. Interfemoral wider, not concealed by the fur behind.
β. Ears longer than the muzzle, attenuated above and acutely pointed.
24. Muzzle and ears shorter; interfemoral less developed in the centre; forearm 6″·5 ..... [p. 47. *Pt. chrysoproctus*,
25. Muzzle and ears much longer; interfemoral 1 inch wide in the centre; forearm 7″·2 ..... [p. 48. *Pt. pteronotus*,
g^5. Wings from the sides of the back, which is covered with short appressed fur.
h^6. Premolars and molars without antero-internal basal projections.
h^7. Interfemoral membrane well developed in the centre, not concealed by the fur.
h^8. Ears much longer than the muzzle, attenuated and acutely pointed.
a. Face reddish brown.
26. Larger: forearm 8″·8; chest and abdomen dark reddish brown or black ..... *Pt. edulis*, p. 49.
27. Smaller: forearm 6″·6; chest and abdomen bright bay or pale yellowish..... *Pt. medius*, p. 51.
β. Face black.
28. Smaller than *Pt. medius*; forearm 6″, wings nearer the spine; premolars with a small posterior basal projection .. [p. 53. *Pt. edwardsii*,
i^8. Ears scarcely as long as the muzzle, conical, obtusely pointed; forearm 6″·5. [p. 54.
29..... *Pt. nicobaricus*,
i^7. Interfemoral membrane narrow in the centre, nearly concealed by the long fur.
j^8. Eyes surrounded by fur not differing in colour from that of the adjacent parts of the face.
j^9. Ears very broadly rounded off above.
30. Fur deep black, with conspicuous yellow tufts over shoulder-glands ..... [p. 55. *Pt. livingstonii*,
k^9. Ears not longer than the muzzle, conical, more or less pointed.
a. Last upper molar with a nearly circular crown.
a'. First upper premolar deciduous; premolars and molars without posterior basal projections.
31. Larger, forearm 7″; breast and abdomen dark brown or black..... *Pt. aleoto*, p. 56.

32. Smaller, forearm 5″·4; breast and abdomen yellowish brown or pale reddish yellow ..... *Pt. hypomelanus*, [p. 57.

β'. First upper premolar persistent; premolars and molars with posterior basal projections.

33. Fur reddish brown; forearm 4″·8..... *Pt. tuberculatus*, [p. 58.

β. Last upper molar narrow, much longer than broad, placed obliquely in the tooth-row.

34. Fur dark brown, back greyish brown; forearm 5″·7 *Pt. fuscus*, p. 59.

l^6. Ears much longer than the muzzle, attenuated above and acutely pointed.

35. Fur, except on the back of the neck, very dark-coloured, thighs clothed above and beneath; forearm 6″·6 ..... *Pt. gouldii*, p. 60.

k^6. Eyes surrounded by more or less conspicuous rings of paler-coloured fur.

36. Ears longer than the muzzle; forearm 7″..... *Pt. conspicillatus*, [p. 61.

37. Ears shorter than the muzzle; forearm 5″·35 ..... *Pt. ocularis*, p. 62.

i^6. The third upper premolar and first molar with more or less distinct antero-internal basal projections.

j^7. Interfemoral membrane very narrow in the centre, concealed by the fur.

α. First upper premolar nearly as large as one of the inner lower incisors.

38. Ears as long as the muzzle; forearm 5″·7..... *Pt. keraudrenii*, [p. 63.

β. First upper premolar deciduous.

39. Ears much longer than the muzzle, acutely pointed; fur covering the sides of the face long and directed backwards; forearm 5″·2..... *Pt. macklotii*, [p. 66.

40. Ears slightly longer than the muzzle; fur of the sides of the face not peculiar; forearm 5″·3. *Pt. caniceps*, p. 68.

k^7. Interfemoral membrane nearly one inch wide in the centre.

41. Ears slightly longer than the muzzle, obtusely pointed, the third upper premolar and first molar with well-developed antero-internal basal projections; forearm 7″·2. *Pt. jubatus*, p. 68.

1. Pteropus vulgaris.

Pteropus vulgaris, *Geoffroy, Ann. du Muséum*, xv. p. 92 (1810); *Temminck, Monogr. Mammal.* i. p. 182 (1827), ii. p. 74 (1835–41).
Spectrum vulgare, *Gray, Catal. Monkeys and Fruit-eating Bats*, p. 100 (1870).

Ears much shorter than the muzzle, almost concealed by the long fur of the head, narrow, acutely pointed, clothed thinly in front and behind by short hairs. Interfemoral membrane narrow, quite concealed by the long fur behind.

Fur everywhere, except on the muzzle, long and woolly, extending upon the sides of the muzzle in front of the eyes, thickly upon the humerus and fleshy part of the forearm, and occupying a space three and a half inches wide across the loins, extending also upon the legs to the ankles, a few hairs covering the backs of the feet, and a band of very short thinly spread hairs about half an inch wide is found along the posterior margin of the wing-membrane from the foot almost as far as the end of the last finger; beneath, the wings are thickly covered with long fur between the humerus and the femur, and a broad band of long fur extends outwards behind the elbow along the forearm.

Face and crown of the head bright yellowish buff; back of the head, neck, and shoulders bright bay or reddish brown, the fur covering the middle of the back between the line of attachment of the wings dark brown, that extending upon the wings and extremities pale buff; under surface of the muzzle and sides of neck yellowish buff or red; neck and anterior part of the chest black or dark reddish brown; breast and abdomen dark reddish brown *, pubis and hair covering the interfemoral membrane yellowish brown or buff.

Crowns of the lower incisors grooved or notched; first upper premolar minute, deciduous; second and third upper and lower premolars with small posterior and external basal cusps.

Length, head and body, about 9″, ear 0″·8, eye from nostril 1″, forearm 6″·2, thumb 2″·5, second finger 4″·5; third finger—metacarp. 4″·1, 1st ph. 3″·05, 2nd ph. 4″·5; fifth finger—metacarp. 4″·2, 1st ph. 2″, 2nd ph. 2″; tibia 2″·9, foot 1″·8.

Hab. Madagascar (Tamatave), Bourbon, and Mauritius.

This species is at once distinguished from all other species of *Pteropus* approaching its size by the remarkably short and very acutely pointed ears, which are clothed on both surfaces. In no other species is the fur covering the sides of the back so peculiarly coloured, and in none (except *Pt. macklotii*) are the sides of the face clothed with equally long hair.

a. ad. sk.		Purchased.
b. ♂ ad. sk.	Mauritius.	H. Whitely, Esq. [P.].

* A specimen in the Leyden Museum, from unknown locality, differs from all others in having the terminal third of the hairs of the chest and abdomen shining yellowish buff.

2. Pteropus rubricollis.

Pteropus rubricollis, *Geoffroy, Ann. du Muséum*, xv. p. 93 (1810); *Temminck, Monogr. Mammal.* i. p. 183 (1827); *Peters, MB. Akad. Berl.* 1867, p. 323.

Muzzle narrow and conical; ears very short, triangular, obtusely pointed, quite concealed by the long fur covering the head; ear-conch thickly clothed on both surfaces with rather long hairs, which extend to the tip. Interfemoral membrane very narrow, concealed by the long soft fur above and beneath.

Fur everywhere very long and dense, and remarkably soft, on the back erect as on the neck, extending outwards thickly upon the humerus and fleshy part of the forearm, and in a narrow line along the distal half of the forearm almost as far as the carpus, also upon the wing-membrane as far as a line drawn from the elbow to the ankle (when the legs are abducted), and upon the legs to the tarsus; beneath, the wing-membrane is similarly but not so thickly covered, and the fur on the legs extends almost as far as the ankles.

Face and head and chin beneath dark brown, the extremities of most of the hairs greyish or shining; a perfect broad collar of light yellowish fur surrounds the neck, reddish yellow on the nape and shoulders, buff or pale yellow beneath; back dark brown, many of the hairs with shining extremities, as on the face; on the legs with an olive tinge; lower part of chest and abdomen dark brown, intermixed with a few long shining hairs. In young individuals the collar is not well marked, being generally similar in colour to the fur of the head, but paler than that of the back.

Upper incisors rather short, obtusely conical; lower inner incisors separated, half the size of the outer incisors; first upper premolar deciduous; premolars and molars small and narrow, with indistinct internal cusps, and no basal ridges or projections.

Length, head and body about 6″, head 1″·9, ear 0″·45, forearm 3″·7, thumb 1″·4, second finger 2″·8; third finger—metacarp. 2″·7, 1st ph. 1″·9, 2nd ph. 2″·7; fifth finger—metacarp. 2″·9, 1st ph. 1″·25, 2nd ph. 1″·1; tibia 1″·5, foot 1″·25.

A specimen in the collection of the Paris Museum has the forearm 3″·9.

Hab. Bourbon, Mauritius. Although associated in these islands with *Pt. vulgaris* it has not been found in Madagascar, which the latter species also inhabits (see P. Z. S. 1875, p. 63). M. Grandidier mentioned to the writer that he had never seen *Pt. rubricollis* during his travels in that island.

This species is at once distinguished by its remarkably short ears, which are densely clothed with long hairs, and wholly concealed by the long fur of the head; also by the extreme softness of the fur covering the body and extending upon the legs.

a, *b*. ad. sks.	Mauritius.	H. Whitely, Esq. [P.].
c. ad. sk.	? Mauritius.	J. Gould, Esq. [P.].
d. ad. sk.		
e. ad. sk.		Leyden Mus.
f, *g*. ad. sks.		Purchased.

3. Pteropus dasymallus.

Pteropus dasymallus, *Temminck, Monogr. Mammal.* i. p. 180, pl. 10 (1827); *Peters, MB. Akad. Berl.* 1867, p. 323; *Dobson, Monogr. Asiat. Chiropt.* p. 16 (1876).

Spectrum dasymallum, *Gray, Catal. Monkeys and Fruit-eating Bats,* p. 101 (1870).

Ears shorter than the muzzle, rising but slightly above the fur of the head, shaped somewhat like those of *Cynopterus marginatus* (Plate III. fig. 2), the upper fourth of the outer margin slightly concave, and of the inner margin convex; basal half of the ear-conch thinly clothed with moderately long hairs; interfemoral membrane very narrow behind, quite concealed in the centre by long fur.

Fur long and woolly on all parts except on the face, on the back similar to the rest of the body; head and face reddish brown; the muzzle darker than the head; nape of neck, shoulders, and part of the back pale buff or yellowish buff, not defined by a straight line, passing rather irregularly into the light brown fur of the back; beneath, a band of unicoloured pale buff fur covers the neck, interrupted in the centre by a few dark brown hairs passing backwards from the chin to the breast; breast and abdomen brown, the extremities of many of the hairs shining yellow.

On the anterior extremities the fur extends densely, covering three fourths of the forearm, and passing outwards upon the wing-membrane almost as far as a line drawn from the distal fourth of the humerus to the knee; the rump and short interfemoral, and the legs to the ankles, are thickly covered with very long hair, while a fringe of fine rather short hairs extends along the margin of the wing-membrane from the ankle almost as far as the extremity of the last finger; beneath the wing-membrane behind the forearm is thickly covered with long hairs, but the lower half of the tibia is naked.

Muzzle rather long and narrow; zygomatic arches not much curved outwards; postorbital process of the frontal rather short and slender, separated from the short ascending process of the zygomatic arch by a wide interval; upper incisors nearly equal, well developed; lower outer incisors about double the size of the inner incisors, which are slightly separated from each other; first upper premolar deciduous, canine and second premolar separated by a rather wide space; lower premolars with basal ridges; last upper molar broadly oval, larger than the last lower molar, which again exceeds the first lower premolar.

Length, forearm 5″·4, thumb 2″·7, first finger 4″; third finger—metacarp. 3″·55; fourth finger—metacarp. 3″·6, 1st ph. 2″·3, 2nd ph. 2″·2; fifth finger—metacarp. 3″·8, 1st ph. 1″·8, 2nd ph. 1″·8; foot 1″·8.

Hab. Japan (Kiousiou Island).

a. ad. sk.	Japan.	Purchased.
b. ♀ imm., al.		Sir E. Belcher [C.].
c. skull of *a*.		

4. Pteropus formosus.

Pteropus formosus, *Sclater, P. Z. S.* 1873, p. 193, pl. xxii. (not described).

Ears scarcely longer than the fur, naked; muzzle as in *Pt. dasymallus*; interfemoral short, concealed by the fur.

Fur dark brown above and beneath, the extremities of many hairs grey; neck in adult male bright yellow or white, with a slightly yellowish tinge, very distinct from the surrounding dark-coloured fur; the collar divided beneath by a narrow but well-defined band of black hairs extending backwards from the throat to the breast; in the female the collar is marked only by the fur being somewhat paler in colour round the neck. Fur everywhere (except on the muzzle) long and soft, extending upon the forearms and upon the tibiæ to the ankles, though not so densely as in *Pt. dasymallus*; beneath, the thighs are covered and part of the tibiæ.

The above description has been taken by me from an inspection of the only specimens of this species as yet obtained, which are still living in the gardens of the Zoological Society of London. The ears are much injured (as I have always observed to be the case in Bats living in captivity), and a correct description cannot therefore be made of them, but they appear to be quite naked, rounded, and scarcely longer than the fur. Their size appears to correspond to that of *Pt. dasymallus*, to which species they are evidently closely allied; but the very distinct white collar (yellow when the specimens were first obtained) in the male and the well-marked dark band dividing it below distinguishes it from *Pt. dasymallus*. Other more important differences may be discovered in the form of the ears and in the dentition when more specimens are obtained, and I agree with Mr. Sclater in considering the Formosan *Pteropus* distinct from the Japanese *Pt. dasymallus*.

The type specimens now living in the gardens of the Zoological Society appear to be about the size of *Pt. dasymallus*.

5. Pteropus pselaphon.

Pteropus pselaphon, *Say, Zoolog. Journ.* 1829, p. 457; *Temminck, Monogr. Mammal.* ii. p. 70 (1835–41).
Pteropus ursinus, *Kittlitz, Temminck, op. cit.* ii. p. 73.
Pselaphon ursinus, *Gray, Catal. Monkeys and Fruit-eating Bats*, p. 110 (1870).

Ears short, subacutely pointed, half concealed by the long fur of the head, but broader at the basal third than in *Pt. dasymallus*, and more attenuated towards their extremities, the basal half of the ear-conch thinly clothed with moderately long hairs; head broad, rather abruptly narrowed in front.

Posterior margin of the very narrow interfemoral membrane concealed by the fur. Fur everywhere long and dense, dark reddish brown throughout, some of the hairs of the back shining or greyish yellow, and, in some specimens, those of the ventral surface also; the fur of the back long, like that of the neck, extending thickly upon

the legs to the backs of the feet, even to the base of the claws, and upon the humerus and the muscular part of the forearm; beneath, long hairs cover the wing-membrane between the anterior and posterior extremities, and the legs almost as far as the ankles.

Upper incisors strong, close together; lower outer incisors double the size of the inner pair, inner incisors close together; canines separated by a rather narrow space from the second premolar, which, with the third premolar, has a posterior and external basal projection; the first upper premolar minute, deciduous; last molar slightly larger than the first lower premolar, which fills up the space between the canine and second premolar; the second and third lower premolars have external and posterior basal cusps; last molar about the size of the first premolar.

Skull remarkably broad across zygomatic arches; muzzle short; a process from the zygoma to meet the postorbital process of the frontal.

Pt. dasymallus has a longer and narrower skull, and the last upper molar is nearly double the size of the first lower premolar.

Length, head and body 8″·5, eye from tip of nostril 1″, ear 0″·8, forearm 5″, thumb 2″·3, third finger 10″, fifth finger 6″·5, tibia 2″·3, foot 1″·8.

Hab. Island of Bonin.

a. ♂ ad. sk.	Island of Bonin.	Dr. J. Richardson [P.].
b. ad. sk.	Island of Bonin.	Zool. Soc. Coll.
c. ♀ ad. sk.		Haslar Museum.
d. skull.		

6. Pteropus vetulus.

Pteropus vetulus, *Jouan, Mém. Soc. Imp. Sci. Cherbourg*, 1863, p. 90.
Pteropus ornatus, *Gray, Catal. Monkeys and Fruit-eating Bats*, p. 105 (1870).

Ears shorter than the muzzle, narrow, and subacutely pointed, clothed with a few short hairs on both sides, nearly concealed by the long fur, which is directed backwards.

In a young male (type of *Pt. ornatus*) the fur is bright ferruginous brown above and beneath; face buff; head ferruginous brown, many of the hairs have their terminal half shining grey; back of neck and shoulders pale buff, almost white; some of the hairs of the back greyish as on the head.

In a female (type of the species) the face is brown, much mixed with grey hairs, so that the prevailing colour is greyish; a white streak, not well-defined in every specimen, extends on each side above the eye, separated by a darker-coloured patch between on the forehead; top and back of the head pale brownish buff, the long fur nearly concealing the ears; nape pale buff, the greater part of the hairs almost white; back yellowish brown, with a streak of lighter-coloured fur passing down the centre, varying much in breadth in different individuals, in young specimens not discernible; chest and abdomen bright yellowish brown.

Fur long, everywhere very soft and dense, except on the anterior extremities, where it extends thinly; the humerus is clothed with appressed yellowish-brown fur, and a small patch of yellow fur appears upon the forearm near the elbow; the legs are covered to the ankles, the hairs passing on to the backs of the feet; on the back the fur is directed backwards, but is not appressed. Beneath a band of fur extends upon the wings almost as far as the carpus, and the space between the humerus and femur is covered; three fourths of the legs are clothed, but not so thickly as on the upper surface.

Upper incisors strong, nearly equal, close together; first upper premolar very small, to the outer side of the tooth-row in the centre of the space between the canine and second premolar; molars well-developed, the antepenultimate molar much exceeding the preceding molar in antero-posterior diameter; the last upper molar oval, slightly larger than the corresponding tooth below; lower outer incisors more than double the size of the inner incisors, which are separated by a slight interval from each other; first lower premolar almost filling up the space between the canine and second premolar; middle premolars and molars with transverse basal ridges behind.

Length (of an adult ♀ in the Paris Museum), head and body about 9″, ear 0″·9, forearm 6″·4, thumb 2″·3; third finger—metacarp. 4″·1, 1st ph. 3″, 2nd ph. 4″·2; fifth finger—metacarp. 4″·1, 1st ph. 1″·85, 2nd ph. 1″·6; foot 1″·7.

Hab. New Caledonia; Loyalty Isles.

The museum has lately obtained from the Rev. S. J. Whitmee a specimen of a *Pteropus* from the Loyalty Isles, which, although differing slightly in the form of the ears and in the colour of the fur, can be regarded only as a local variety of this species. The ears are shorter and broader than in *Pt. vetulus* from New Caledonia; face beneath the eyes and the inferior surface of the muzzle greyish ferruginous; upper surface of the muzzle greyer, a greyish streak above each eye; head pale yellowish brown in front, reddish brown behind; neck and shoulders bright yellowish buff, the greater part of the hairs bright buff; back yellowish brown along the middle, ferruginous brown on the sides; the hairs on the forearm ferruginous, as in specimens from New Caledonia; breast and abdomen bright yellowish, pubis yellowish brown. Distribution of the fur as in other specimens; the thighs and legs densely covered above as far as backs of feet, but the toes are naked; beneath, the thighs and the upper parts of the tibiæ are thickly covered.

The upper incisors are not so strong as in New-Caledonia specimens, and are separated by an interval from each other.

a. ♂ imm.	New Caledonia (Port de France). (Type of *Pteropus ornatus*, Gray.)	Purchased.
b. ♀ ? ad., al.	Loyalty Isles (Lifu).	Rev. S. J. Whitmee.

7. Pteropus aneiteanus.

Spectrum anetianum, *Gray, Catal. Monkeys and Fruit-eating Bats*, p. 101 (1870).

Muzzle much shorter than in *Pt. dasymallus*; ears slightly shorter than the muzzle; the ear-conch almost naked, but more than half concealed by the long fur of the neck and side of the head, inner and outer margins equally slanting inwards above to form the narrowly rounded tip. Interfemoral membrane scarcely developed in the centre, quite concealed by the long woolly fur.

Face, head, chin, and throat dark brown, the extremities of the hairs pale brown or shining; back of the head, nape, and collar bright reddish brown; shoulders and anterior part of the back pale yellow; back reddish brown, with paler extremities, becoming yellowish brown posteriorly; chest and abdomen dark brown, sides of the body reddish brown.

Fur, above long and woolly; on the back nearly as long as that on the neck and shoulders, and not appressed, extending outwards thickly upon the humerus and forearm, and, posteriorly, upon the legs to the ankles, but leaving the feet naked, and densely clothing the short interfemoral membrane; beneath the tibiæ are nearly naked.

Facial bones much shorter than in *Pt. dasymallus* (see Table, p. 30), although the distance from the occipital crest to the supra-orbital foramen is the same in both species; upper incisors nearly equal; lower outer incisors more than double the size of the inner incisors, which are not separated by a space in the centre; *first upper premolar as large as one of the inner lower incisors*, persistent, nearly filling up the space between the canine and second premolar by its base; second upper premolar and third lower premolar with a small antero-internal basal cusp, as in *Pt. jubatus*; premolars and molars (except first premolar and last molar) acutely tubercular (*vide* Plate IV. fig. 2), more so than in any other species of the genus, each tooth with prominent external and internal cusps and a well-defined cingulum, forming a small antero-internal basal cusp in front, a raised ridge on the inner side of the tooth, and a transverse ridge behind; last upper molar not larger than one of the outer lower incisors, and scarcely more than half the size of *the first lower premolar, which quite fills up the space between the canine and second premolar*; last lower molar very small and circular, scarcely larger than one of the middle lower incisors.

Length, head 2″·3, ear 0″·8, eye from tip of nostril 0″·8, forearm 4″·5, thumb 2″, first finger 3″·4; second finger—metacarp. 3″·1, 1st ph. 2″·4, 2nd ph. 3″·6; fourth finger—metacarp. 3″·3, 1st ph. 1″·6, 2nd ph. 1″·65; tibia 2″·2, calcaneum 0″·4, foot 1″·5.

Hab. New Hebrides (Aneiteum Island).

This species is at once distinguished by the very peculiar character of its teeth, of which the premolars and molars are more acutely tubercular than in any other species of the genus.

In the following Table the measurements of the skull of *Pt. aneiteanus* are compared with those of *Pt. dasymallus* and *Pt. pselaphon*:—

	Pt. dasymallus.	*Pt. pselaphon.*	*Pt. aneiteanus.*
Extreme length from occipital crest to end of nasal bones	in. 2·45	in. 2·45	in. 2·2
Breadth across zygomatic arches	1·25	1·4	1·3
Length from supraorbital foramen to extremity of nasal bones	1·1	0·95	0·85
From infraorbital foramen to extremity of nasal bones	0·75	0·65	0·55
Space occupied by last four upper molars	0·7	0·7	0·6
Space occupied by last four lower molars	0·8	0·83	0·7

a, *b*. ♂ and ♀ ad. sks. (type). Aneiteum Island. J. Macgillivray [C.].
c, *d*. ♂ ad. sks. Aneiteum Island. F. M. Rayner, Esq. [P.].
e. skull of *a*.
f, *g*. ♀ skulls. Aneiteum Island. J. Macgillivray [C.].
h. imm. skull. Aneiteum Island.
i, skull of *c*.

8. Pteropus molossinus.

Pteropus molossinus, *Temminck, Esquiss. Zool. sur la côte de Guiné*, p. 62 (1853); *Peters, MB. Akad. Berl.* 1867, p. 332.

About the size of *Pt. rubricollis*, resembling *Pt. pselaphon* in the colour and quality of the fur, but differing remarkably from both in dentition and in the distribution of the fur.

Ears very narrow, small, and acutely pointed, scarcely longer than the fur of the head, but nearly naked. Interfemoral membrane narrow in the centre, concealed by the fur.

General colour of the fur dark reddish brown, with a few long grey and shining hairs above and beneath; head and *back of neck darker* than body, reddish between the eyes; a tuft of bright yellow hairs over each shoulder-gland; back and rump more reddish brown.

Fur soft, woolly, and erect; on back half erect, not appressed, directed backwards; scarcely any hairs extend upon the forearms or legs above, and the membranes beneath are also nearly naked.

Muzzle rather short; zygomatic arches wide, without ascending process; upper incisors short, contiguous; lower incisors in pairs, separated by a space in the middle; the inner incisors very small, scarcely one fourth the size of the outer incisors, and placed in front of their inner and anterior sides; first upper premolar persistent, acutely pointed, in the rather narrow space between the canine and second premolar, which it half fills up, *nearly as long as and in cross-section equal to half the diameter of one of the outer upper incisors*; second lower premolar large, with a small but well-defined antero-internal basal cusp, both it and the corresponding tooth in the upper jaw and the third lower premolar with small posterior basal cusps; last upper molar slightly larger than the last lower molar, which has an oval crown, and scarcely more than half as large as the first lower molar, which very nearly fills up the space between the canine and second premolar.

Length (of the type specimen, an adult ♂), head and body about

7″, head 2″·6, ear 0″·4, eye from nose about 0″·4, forearm 3″·5, thumb 1″·4; third finger—metacarp. 2″·3, 1st ph. 1″·6, 2nd ph. 2″·5; fifth finger—metacarp. 2″·45, 1st ph. 1″·05, 2nd ph. 1″·15; tibia 1″·5, foot 1″·2.

Hab. Unknown.

Type in the collection of the Leyden Museum.

The position of this very remarkable species in the genus is difficult to determine. While resembling the species allied to *Pt. vulgaris* in the quality of the fur and in the short ears, it differs from them altogether in the nakedness of the extremities, and agrees in dentition most closely with *Pt. aneiteanus* and *Pt. jubatus*.

9. Pteropus poliocephalus.

Pteropus poliocephalus, *Temminck, Monogr. Mammal.* i. p. 179 (1827).

Nearly as large as *Pt. gouldii*, and with similarly long and pointed ears, but differing remarkably from that species, as well as from every species of the genus of the same size, in the quality, colour, and distribution of the fur.

Ears much longer than the muzzle; the upper third of the ear-conch narrow, subacutely pointed, and concave beneath the tip, which is inclined outwards; the concave surface clothed with fine hairs. Interfemoral membrane very narrow in the centre, concealed by the fur.

Fur everywhere long and dense, extending thickly upon the face and upon both sides of the legs, above to the ankles, beneath as far as the ends of the tibiæ; fur of the back directed posteriorly and slightly appressed, occupying a space quite three inches wide across the loins, short but dense on the arm and muscular part of the forearm, on the legs and rump woolly; beneath, the whole membrane between the humerus and the thighs is covered; fur nearly two inches wide behind the elbow.

Fur of the head grey with a yellowish tinge, the base of the hairs dark brown or black; neck and shoulders and anterior part of the breast bright reddish yellow; breast from shoulder to shoulder blackish grey, some of the hairs with yellowish extremities; middle of the lower part of the chest and abdomen black at the base, the terminal third of the hairs shining yellowish grey; back greyish black, many of the hairs with shining extremities; the fur covering the interfemoral membranes and legs of the same colour as on the abdomen.

Teeth rather narrow, like those of *Pt. medius*; the first lower premolar smaller than the last molar, in the centre of the space between the canine and second premolar; first upper premolar minute, scarcely visible; lower incisors small, the inner pair half the size of the outer and slightly separated.

Length, head and body 8″·5, head 2″·8, ear from end of nostril 2″·3, eye from end of nostril 1″·1, ear 1″·45 × 0″·7, forearm 6″·2, thumb 2″·5; third finger—metacarp. 4″, 1st ph. 3″·15, 2nd ph. 4″·8;

fifth finger—metacarp. 4″, 1st ph. 1″·75, 2nd ph. 1″·85; tibia 2″·85, foot 2″·4.

Hab. Australia.

a, b, c. ♂ and ♀ ad. sk.	Australia.	
d. ♀ ad. sk.	Clarence River, E. Australia.	
e, f. ♂ ad. sk.	Australia.	Dr. Merriman [P.].
g. ad. sk.	Cape Upstart.	
h. ad. sk. (Shot while feeding on the blossom of *Eucalyptus*.)		
i. imm. sk.	Australia.	Purchased.
j. ad. sk.	Australia.	Purchased.
k. ♀ imm. al.	Port Stephens.	Dr. G. Bennett [P.].
l. ♀ ad. sk.		
m, n. ♂ ad. sk.	No history.	

10. Pteropus leucopterus.

Pteropus leucopterus, *Temminck, Esquiss. Zoolog. sur la côte de Guiné*, p. 60 (1853).

Spectrum leucopterum *et* Pteropus chinensis, *Gray, Catal. Monkeys and Fruit-eating Bats*, pp. 102 & 111 (1870).

Ears as long as the muzzle, conical, with obtuse rounded-off extremities, naked.

Wings from the sides of the back, nearly two inches apart at their origin; interfemoral membrane very short in the middle, completely concealed by the dense woolly fur.

The whole of the fur and membranes are of a pale colour; above pale buff, the base of the hairs slightly darker or uniform with the extremities; beneath, the fur is much shorter and pale brownish buff. Membranes and ears pale brown throughout.

Above, the fur of the head and neck and that covering the rump and legs is soft, very dense and woolly, but not long, that covering the back slightly shorter and directed backwards, occupying a space about three inches wide across the loins. Short appressed fur extends outwards on the humerus, elbow, and three fourths the forearm, and the legs to the ankles are thickly covered with erect woolly fur; beneath, the thighs and the proximal third of the tibiæ are covered, and the wing-membrane between the humerus and femur and along the forearm is thinly clothed.

The skull differs from that of any other known species of the genus in the peculiar character of the teeth, and in the postorbital process of the frontal being connected by bone (even in immature individuals) with the zygomatic arch, so that the orbital ring is complete in front. The upper incisors are very strong and close together, each with a prominent projecting base behind, the outer incisors considerably larger than the inner ones; lower inner incisors exceedingly small, not one sixth the size of the outer incisors, which are as large in cross-section at their bases as the posterior lower molars; the first upper premolar is much larger than in any other species of *Pteropus*, more than half filling the space between the canine and second premolar, and nearly equal to one of the middle

upper incisors in cross section; the antepenultimate molar above is smaller than the preceding tooth; the last molar has two blunt anterior cusps as in the other molar teeth, and equals or slightly exceeds one of the outer incisors in cross section; the lower molars are deeply grooved, and the sides of the groove forming the outer and inner cusps are notched above; all the teeth remarkably broad and strong (Plate IV. figs. 1, 1 *a*, 1 *b*).

This very peculiar dentition has not been previously noticed. It, no doubt, indicates some important difference in the food of this species from that of most of the other species of the genus.

Length (of an old ♀), head and body about 10″, ear 1″, forearm 6″, thumb 2″·3, second finger 4″; third finger—metacarp. 3″·8, 1st ph. 2″·9, 2nd ph. 4″·3; fifth finger—metacarp. 4″, 1st ph. 1″·65, 2nd ph. 1″·8; tibia 2″·3, foot 1″·8.

Hab. Philippine Islands.

a.	♀ ad. sk.	Philippine Islands.	Purchased.
b.	♀ ad. sk.	China? (Type of *Pt. chinensis*, Gray.)	Mr. Fortune [C.].
c.	skull of *a*.		

11. Pteropus rayneri.

Pteropus rayneri, *Gray, Catal. Monkeys and Fruit-eating Bats*, p. 108 (1870).

Ears as in *Pt. keraudrenii*, shorter than the muzzle, narrowly rounded off above.

Interfemoral membrane very narrow in the centre, concealed by the fur.

Muzzle grey; face about the eyes and forehead brown with numerous silvery grey hairs; head reddish brown, extremities of several hairs greyish or shining; nape of the neck and shoulders bright ferruginous brown, duller beneath; fur of the back short, appressed, extending for about half an inch on the membranes on each side beyond their line of origin from the back, dark reddish brown, extending also in a thin line upon the humerus and upon the fleshy part of the forearm; rump and legs almost as far as the ankles covered with long, woolly, yellow hairs, which completely conceal the narrow interfemoral membrane in the middle; breast and upper part of abdomen of the same colour as the back; abdomen and thighs as on the upper surface.

Incisors and molars large, well developed, the latter without basal cusps or ridges; lower outer incisors three times as large as the inner ones; first upper premolar nearly as large as one of the inner lower incisors; second premolar not widely separated from the canine; first lower premolar nearly filling up the space between the canine and second premolar, larger than the last upper molar; last lower molars small, circular, about half the size of the outer lower incisors; postorbital processes of the frontal scarcely more than half circumscribing the orbit, no corresponding zygomatic process; facial bones rather short, as in *Pt. aneiteanus*, which, on the whole,

this species closely resembles in the form of the skull, but differs as remarkably in the form of the teeth.

Length (of the type specimen, an adult ♀), head and body about 8″, head 2″·5, ear 0″·9, eye from tip of nostril 0″·9, forearm 5″·3, thumb 2″·1, second finger 3″·8; third finger—metacarp. 3″·6, 1st ph. 2″·7, 2nd ph. 4″·1; fifth finger—metacarp. 3″·8, 1st ph. 1″·55, 2nd ph. 1″·4; tibia 2″·4, calcaneum 0″·65, foot 1″·6.

Hab. Solomon Islands (Guadalcanar, San Christoval).

a, b. ♀ ad. sk. (type).	Guadalcanar Island.	F. M. Rayner, Esq. [P.].
c, d. ♂ imm. sks.	San Christoval.	Voyage of the 'Herald.'
e. skull.	San Christoval.	Voyage of the 'Herald.'

12. Pteropus lombocensis.

Pteropus macklotii, *Gray* (in part) (*non Temminck*), *Catal. Monkeys and Fruit-eating Bats*, p. 110, var. ? (1870).

Much smaller than *Pt. medius*. Muzzle rather short; ears slightly longer than the muzzle, triangular above, with narrowly rounded-off extremities; the upper third of the outer margin slightly concave beneath the tip; the inferior half of the margin of the ear-conch in front clothed with moderately long hairs (Plate III. fig. 4).

Wings about one inch apart at their origin from the sides of the back; interfemoral membrane very short in the middle, quite concealed by the fur in that part.

Fur moderately long, fine and dense, scarcely extending upon the humerus or forearm, but covering the upper surface of the legs almost to the ankles; on the back short, appressed, very different from the straight erect fur covering the neck and rump.

General colour of the fur yellowish brown; ears and membranes dark brown; head and back darker yellowish brown; neck and shoulders paler and brighter yellowish brown, the extremities of the hairs shining; chest and abdomen dull yellowish brown.

Upper incisors moderately strong, equal, the middle pair separated slightly; lower middle incisors close together, very small, not one quarter the size of the outer incisors, which also considerably exceed them in height; first upper premolar present in the type specimens (which appear to be quite adult), in the outer side of the rather narrow space between the canine and second premolar, and about as large as one of the middle lower incisors; first lower premolar almost filling up the space between the adjoining teeth; last upper and lower molars extremely small, smaller than in any other known species of the genus, with circular crowns, scarcely larger than the small internal lower incisors; the other molars and premolars as in *Pt. medius*, but smaller (Plate IV. fig. 4).

Length (of an adult ♂), head and body about 7″, ears 0″·9, forearm 4″·5, thumb 1″·8, second finger 3″·2; third finger—metacarp. 2″·9, 1st ph. 2″·1, 2nd ph. 3″·1; fifth finger—metacarp. 3″·25, 1st ph. 1″·4, 2nd ph. 1″·15; tibia 1″·9, foot 1″·4.

Hab. Lombock Island.

This species resembles *Pt. rayneri* generally in the prevailing brown colour of the fur and in its quality and distribution; but is easily distinguished by the much more pointed ears, by the naked condition of the forearm, by the conspicuous radiating patches of hairs over glands on the shoulders, by the yellow- not ferruginous-brown colour of the fur covering the shoulders and the under surface of the body, by the conspicuously smaller measurements, and especially by the remarkably small size of the last upper molars, which in *Pt. rayneri* are as large as the outer lower incisors.

a. ♂ ad. sk. (type).	Lombock Island.	A. R. Wallace, Esq. [C.].
b. ♂ ad. sk.		A. R. Wallace, Esq. [C.].
c. skull of *b*.		

13. Pteropus samoensis.

Pteropus samoensis, *Peale, United-States Explor. Exped.* p. 20 (1848).
Pteropus nawaiensis, *Gray, Catal. Monkeys and Fruit-eating Bats*, p. 107 (1870).
Pteropus vitiensis, *Gray, op. cit.* p. 109.
Pteropus whitmeei, *Alston, P. Z. S.* 1874, p. 96, pl. xiv.

Ears slightly shorter than the muzzle, conical, narrowly rounded off at the tip or subacutely pointed, the concave front surface of the conch thinly clothed with short hairs.

Interfemoral membrane very narrow, quite concealed in the centre by long fur.

Fur soft and dense, extending upon the sides of the face in front of the eyes, covering the back for a breadth of two inches across the loins, and thickly clothing the legs to the ankles. The fur of the back is long and dense, and differs from that of the neck in being directed backwards, but is not closely appressed.

Face, in front of and above and below the eyes, in the male dark brown intermixed with some shining hairs, silvery on the muzzle above; crown of the head bright yellow, neck reddish yellow, shoulders as the head, back reddish brown; beneath, the chin is dark brown, the neck ferruginous brown, breast and abdomen reddish brown. In the female the face is silvery white, intermixed with a few black hairs; crown of the head shining buff, neck pale yellow, the shoulders as the head; back brown, the extremities of many hairs shining grey; beneath, the whole under surface is dark brown, more or less mixed with silvery hairs, the sides of the neck yellow.

In a young female from Samoa, with forearm 2⅛ inches long, the hair covering the back and the hinder extremities almost to the ankles is nearly as long and dense as in adult individuals. The head is pale yellowish grey throughout, the grey colour predominating; the back of the neck dark reddish brown, the extremities of some hairs bright silvery; back dark brown, also with some silvery hairs. Beneath, the neck is brighter reddish brown; the breast and abdomen reddish brown with greyish extremities.

Upper incisors strong, slightly notched; lower incisors separated

by a narrow space in the middle, the inner half the size of the outer incisors, all bifid; second upper premolar rather close to the canine; the first small premolar, in immature individuals, quite filling up the space between the canine and second premolar, in adults often deciduous; premolars and molars broad, each with a posterior basal ridge, forming a small projection externally; last upper molar slightly larger than the first lower premolar; last lower molar about the size of one of the outer incisors; the antepenultimate upper molar with a very long antero-posterior diameter.

Length, head and body about 8″, head 2″·5, ear 0″·85, eye from end of nose 0″·9, forearm 5″, thumb 2″, second finger 3″·6; third finger—metacarp. 3″·25, 1st ph. 2″·4, 2nd ph. 3″·8; fifth finger—metacarp. 3″·4, 1st ph. 1″·5, 2nd ph. 1″·4; tibia 2″·1, foot 1″·6.

Hab. Fiji Islands; Navigators' Islands.

This species resembles *Pt. keraudrenii* (which inhabits the same islands) in size, in the form of the ears, and, to a considerable extent, in the colour of the fur; but may be at once distinguished by the different quality of the fur of the back, and by the legs being well covered almost to the ankles. This is as well seen in young specimens as in old individuals*.

On the habits of this species see remarks by Rev. S. J. Whitmee in the 'Proceedings' of the Zoological Society, 1874, p. 666.

a, *b*.	♂ imm. & ad. sks.	Ovalau Island, Fiji. (Type of *Pteropus vitiensis*, Gray.)	F. M. Rayner, Esq. [P.].
c.	♀ ad. sk.	Nawai Island, Fiji. (Type of *Pteropus nawaiensis*, Gray.)	Voyage of the 'Herald.'
d.	♀ juv. sk.	Samoa.	Rev. S. J. Whitmee [P.].
e.	♀ imm., al.	Samoa.	Purchased.
f.	skull.	Nawai, Fiji Islands.	
g.	skull of *a*.		

14. Pteropus rodricensis.

Ears slightly longer than the muzzle, but projecting by their upper third only from the long fur surrounding them; ear-conch moderately broad in lower three fourths, very abruptly narrowed above by flattening of the upper fourth of the inner margin and a deep concavity of the corresponding part of the outer margin, terminating in a narrow acute tip; more than two thirds of the concave surface of the conch is well clothed with moderately long hairs, the uppper fourth and the back of the ear naked or with a few short hairs only (Plate III. fig. 1).

Fur long and dense, in quality intermediate between that of *Pt. edwardsii* and *Pt. vulgaris*; that covering the back of the head, neck, and shoulders very long, on the back shorter but not appressed, the hairs directed backwards, extending thickly upon the wings almost as far outwards as a line drawn from the proximal third of the

* The Rev. S. J. Whitmee has presented to the British Museum a very young specimen of this species and of *Pt. keraudrenii* from Samoa. These differ remarkably in the colour and distribution of the fur, and at once show how distinct the species are. (See description of *Pteropus keraudrenii*.)

humerus to the knee, upon the femur, knee, and adjoining wing-membrane along the proximal third of the tibiæ, about two thirds of which are thickly covered with straight hairs directed backwards, their distal thirds being nearly naked as well as the feet; and, although the fur of the back extends upon the interfemoral membrane, it does not conceal its posterior margin, and its lower third, supported by the calcanea, is naked. Beneath, the antebrachial membrane is covered with long thinly-spread hairs, and similar hairs clothe the wing-membrane between the humerus and femur, and extend outwards in a broad band behind the forearm. Face reddish brown, with a few greyish or shining hairs; chin and throat darker brown; top of the head and nape reddish or yellowish brown, passing into a band of bright yellow, which extends across the back of the neck from shoulder to shoulder, and downwards on the sides of the neck and thorax, limited by a longitudinal band of dark fur passing backwards from the chin along the thorax to the abdomen, which is clothed with dark brown fur, of which some hairs have greyish or shining extremities; fur of the back behind the shoulders dark brown, the extremities of the hairs more or less yellowish. In the male the extremities of the hairs on the head and back are much brighter-coloured than in the female.

First upper premolar deciduous; the second upper premolar and the second and third lower, also the first and second upper molars and the first lower, have each a small but distinct posterior basal cusp; even the small first lower premolar has an indication of a posterior basal cusp; last upper molar very small and circular, not as large as the first lower premolar; last lower molar slightly larger than the first lower premolar.

Length (of an adult ♂ preserved in alcohol), head and body 7″, head 2″·2, ear 0″·9, ear from tip of nostril 2″, eye from tip of nostril 0″·8, forearm 4″·9; thumb—metacarp. 0″·35, ph. and claw 1″·6; third finger—metacarp. 3″·3, 1st ph. 2″·4, 2nd ph. 3″·55; fourth finger—metacarp. 3″·25, 1st ph. 2″, 2nd ph. 1″·85; fifth finger—metacarp. 3″·35, 1st ph. 1″·5, 2nd ph. 1″·45; tibia 2″·25, calcaneum 0″·6, foot 1″·15.

Hab. Island of Rodriguez.

a–d. ♂ & ♀ juv. et ad., al.	Rodriguez.	Royal Society.
e. ♀ ad.	Rodriguez.	Royal Society.
f. ad. sk.	Rodriguez.	Royal Society.
g. skeleton.	Rodriguez.	Royal Society.

15. Pteropus brunneus.

Ears as in *Pt. keraudrenii*, but naked, scarcely as long as the muzzle, triangular above, obtusely pointed (Plate III. fig. 6).

Interfemoral membrane very narrow behind, concealed by the fur in the centre.

Fur rather short throughout, longer on the neck than on the back, where it is directed backwards and slightly appressed, occupying a

space nearly two inches wide across the middle of the back; forearm clothed with a few short hairs only, but the legs are covered almost to the ankles; beneath, the thighs only are covered, and a few fine erect hairs occupy the wing-membrane between the humerus and femur and behind the forearm.

General colour yellowish brown; head yellowish brown, with a few shining hairs, the base of the fur dark brown; breast and abdomen somewhat similar, but the base of the hairs not so dark as on the upper surface; above, the neck is brighter yellowish brown; the back similar to the head.

The skull is differently shaped from that of *Pt. samoensis*, the facial bones are longer, and the zygomatic arches less curved outwards; premaxillary bones more slender and incisors smaller; first upper premolar very small, in the narrow space between the canine and second premolar; last upper molar as large as the first lower premolar; remaining teeth as in *Pt. medius*, without basal projections or cusps.

Length (of the type specimen, a nearly adult ♂), head and body about 8″, head 2″·3, ear 0″·8, eye from tip of nostril 0″·9, forearm 4″·5, thumb 1″·9, second finger 3″·4; third finger—metacarp. 3″·1, 1st ph. 2″·35, 2nd ph. 3″·8; fifth finger—metacarp. 3″·4, 1st ph. 1″·45, 2nd ph. 1″·5; tibia 2″·1, foot 1″·5.

Hab. Percy Island, near east coast of Australia.

This species is distinguished from *Pt. poliocephalus* by the very differently shaped ears, by the colour and quality of the fur, and by its conspicuously smaller size; from *Pt. samoensis*, which it probably approaches most closely, by the naked ears, quite differently coloured fur, and by the much broader premolars and molars without basal projections, as well as by the very small size of the first upper premolar; from *Pt. gouldii*, which inhabits the same island, by the quite differently shaped ears, by the colour and distribution of the fur, and by its much smaller size.

a. ♂ nearly ad. sk. (type). Percy Island. Captain Denham [C.].
b. skull of *a*.

16. Pteropus personatus.

Pteropus personatus, *Temminck, Monogr. Mammal.* i. p. 189; *Gray, Catal. Monkeys and Fruit-eating Bats*, p. 111, with a woodcut (1870).

Ears slightly longer than the muzzle, oval, rounded off above.

Interfemoral membrane narrow behind, concealed by the fur. Face pale buff-white, marked by conspicuous well-defined brown streaks: on each side a brown streak extends from the nostril to the eye, where it divides, one half passing upwards and backwards above the eye to the crown of the head (being separated from the posterior half of the eyelid by a white patch), the other half passes along the margins of the upper and lower eyelids, and reappears at the posterior angle of the eye, behind which it extends for a short distance, where it joins at right angles the commencement of a

broad band, which passes directly downwards, and meets beneath the jaws the corresponding band from the opposite side. Head and neck yellowish white, the extremities of the hairs on the back of the neck more or less bright yellow; back brownish grey, the extremities of the hairs almost white; beneath pale brown, the terminal half of the hairs pale yellowish.

Fur everywhere very soft and dense (as in *Pt. temminckii*), though not long, widely covering the loins, and extending thinly upon the humerus and forearms, and upon the backs of the legs and the adjoining wing-membrane to the ankles, and concealing the very narrow interfemoral membrane in the middle.

Outer lower incisors much longer than the inner ones, which are separated by an interval; molars feeble, narrow, the internal cusp scarcely developed; first upper premolar closer to the canine than to the second premolar, as large as one of the inner lower incisors; a wide space between the lower canine and second premolar, in the anterior half of which the first lower premolar is placed; last lower molar scarcely larger than one of the outer lower incisors.

Length (of an adult ♀), head and body about 5″·5, head 1″·8, ear 0″·7, eye from tip of nostril 0″·7, forearm 3″·6, thumb 1″·6, second finger 3″; third finger—metacarp. 2″·7, 1st ph. 2″, 2nd ph. 2″·8; fourth finger—metacarp. 2″·55, 1st ph. 1″·55, 2nd ph. 1″·6; fifth finger—metacarp. 2″·6, 1st ph. 1″·2, 2nd ph. 1″·2; tibia 1″·7, calcaneum 0″·4, foot 1″·25.

Hab. Ternate.

a, b. ♂ & ♀ ad. sk.	Ternate.	A. R. Wallace, Esq. [C.].
c. ♂ ad. sk.		
d. skull of *c.*		

17. Pteropus capistratus.

Pteropus capistratus, *Peters, MB. Akad. Berl.* 1876, p. 316 (with a coloured plate); *Dobson, P. Z. S.* 1877, p. 116.

Closely allied to *Pt. personatus*, but distinguished immediately by the different character of the facial streaks, and by its conspicuously larger size.

Ears as in *Pt. personatus*, as long as the muzzle, and similarly rounded off at their extremities. Face pale yellowish white; between the eyes and the ears a black ring surrounds the muzzle, meeting above on the forehead a black longitudinal streak, which extends backwards from the nose between the eyes, and on either side behind the angle of the mouth a similar black streak, which passes downwards and backwards from the upper surface of the muzzle in front of the eye, while a much smaller and narrower dark line of fur extends forwards from the anterior and backwards from the posterior commissure of the eyelids.

The colour of the remaining parts of the fur is generally similar to that of *Pt. personatus*, but the hairs are longer and extend even more thickly upon the membranes and posterior extremities.

Teeth as in *Pt. personatus*.

Length (of an adult ♀), head and body about 7″, head 2″, ears 0″·8, eye from nostril 0″·8, forearm 4″·4, thumb 1″·8, second finger 3″·25; third finger—metacarp. 2″·85, 1st ph. 2″·3, 2nd ph. 3″·6; fourth finger—metacarp. 2″·85, 1st ph. 1″·8, 2nd ph. 1″·7; fifth finger—metacarp. 3″·1, 1st ph. 1″·4, 2nd ph. 1″·3; tibia 1″·85, foot 1″·4.

Hab. New Ireland, Duke of York Island, and New Britain.

Type in the collection of the Berlin Museum.

a, b. ♀ ad. sks.	Duke of York Island.	Rev. G. Brown [C.]

18. Pteropus wallacei.

Pteropus wallacei, *Gray, P. Z. S.* 1866 (with a woodcut of the head); *Catal. Monkeys and Fruit-eating Bats.*

The only specimen of this species as yet obtained is an example of a very young individual, in which the epiphyses of the finger-bones are quite separate, and the permanent teeth have not appeared. Dr. Peters believes it to be the young of *Pt. personatus*, and in the absence of other equally immature specimens of that species I am unable to confirm or reject his hypothesis. However, as the peculiar markings of the fur of the face are very different from those of *Pt. personatus*, I think it better to consider *Pt. wallacei* a distinct species until the question can be decided by the inspection of equally young specimens of *Pt. personatus*.

The face and crown of the head are reddish brown; a small oblong patch of white hairs directed backwards appears above the eye on each side; a narrow but very distinct streak of similarly coloured fur extends along the centre of the muzzle as far back as the space between the eyes, and a band of white hairs margins the upper lip; the remainder of the fur is soft and woolly, and resembles that of *Pt. personatus* in colour, quality, and distribution.

Hab. Macassar, Celebes.

a. imm. sk. (type).	Macassar.	A. R. Wallace, Esq. [C.].

19. Pteropus temminckii.

Pteropus griseus, *Temminck* (non *Geoffroy*), *Monogr. Mammal.* ii. p. 81 (1835–41) (vide *Peters, MB. Akad. Berl.* 1867, p. 331); *Gray, Catal. Monkeys and Fruit-eating Bats*, 1870, p. 110.
Pteropus temminckii, *Peters, l. c.*

Ears about as long as the muzzle, narrowly rounded off above, naked; the outer and inner margins of the conch converging almost equally towards the tip. Wings from the back near the spine, scarcely one third of an inch apart at their origin. Interfemoral membrane very narrow in the middle, completely concealed by the dense fur. The fur of the upper surface extends thinly and very short upon the arm and forearm, but thickly clothes the thighs, and passes along the tibiæ almost to the ankles; beneath, the thighs are

also clothed, and fine long hairs extend upon the wing-membrane between the humerus and femur and behind the forearm.

Fur everywhere soft, very dense and woolly, and moderately long, even on the back, where it is directed backwards, occupying a space nearly two inches wide across the loins. Above shining buff, the basal two thirds of the hairs reddish brown; beneath dull buff, the base of the hairs brownish; on the back of the neck the terminal half of the hairs bright yellowish buff. On the whole, the fur on the upper surface is like that of *Pt. personatus* without the black streaks on the face. Membranes light reddish brown.

In the type specimen in the Leyden Museum the fur and membranes are much paler throughout, the back silvery grey with a few intermixed light brown hairs, head above and beneath pale buff, back of neck yellowish buff, wings half an inch apart, but the fur occupies a space two and a half inches wide across the loins.

Skull with a long and narrow facial portion; zygomatic arches moderately curved outwards, with a small ascending process; dentition as in *Pt. medius*.

Length (of a not quite adult ♂), head and body about 6″, ear 0″·75, eye from nose 0″·75, forearm 3″·8, thumb 1″·55, second finger 2″·65; third finger—metacarp. 2″·5, 1st ph. 1″·9, 2nd ph. 2″·8; fifth finger—metacarp. 2″·65, 1st ph. 1″·1, 2nd ph. 1″; tibia 1″·6, foot 1″·1.

The type in the Leyden Museum is an example of a quite adult individual. It has the forearm 4 inches long, so that the specimen from which the above measurements have been taken is evidently nearly full-grown.

Hab. Semao, Timor, Amboina, Ceram.

This species is easily distinguished by its soft and almost unicoloured pale buff silky fur, which, though not long, thickly covers the back, and descends upon the legs almost to the ankles; also by its teeth, which are like those of *Pt. medius*, but smaller, and by its small size.

a. imm. sk.	Ceram.	Purchased.
b. ♀ ad. sk.	Timor.	Purchased.
c. skull of *a*.		

20. Pteropus scapulatus.

Pteropus scapulatus, *Peters, MB. Akad. Berl.* 1862, p. 574.
Pteropus elseyi, *Gray, P. Z. S.* 1866, p. 67; *Catal. Monkeys and Fruit-eating Bats*, p. 108 (1870).

Ears narrow and subacutely pointed, longer than the muzzle, naked, the upper third of the outer margin of the conch slightly concave; muzzle long and rather narrow, as in the group *Macroglossi*.

Interfemoral narrow behind, but its posterior margin beneath is not concealed by the fur; wings about an inch apart at their origin from the back.

General colour of the fur reddish or yellowish brown. Face and under surface of muzzle dark brown with some greyish hairs, on the

crown of the head the extremities of the hairs are yellowish brown; throat reddish brown, a much paler or yellowish-brown collar surrounds the neck; on each shoulder (in adult males only) a tuft of light buff-coloured hairs, and the fur of the antebrachial and wing-membrane beneath is of the same pale colour; back, breast, and abdomen dark reddish brown.

Fur of the back short and appressed, occupying a space in the middle of the back about two inches wide, and short appressed hairs appear upon the humerus and upon the fleshy part of the forearm, also extending thinly outwards upon the legs almost as far as the ankles. Beneath, the extremities are nearly naked, but the antebrachial membrane and the wing-membrane between the humerus and femur and along the forearm are covered with long woolly hair.

The types of *Pt. elseyi*, Gray, all appear to be immature individuals. In them the general colour of the fur is reddish or yellowish brown throughout, the neck surrounded by a collar of paler coloured fur, without any trace of white shoulder-tufts.

The dentition is very peculiar, the teeth resembling those of the species of the genera *Eonycteris* and *Macroglossus*. The canines are remarkably long and slender, and deeply grooved longitudinally in front; *all the teeth are very narrow and unicuspidate*; the central pair of upper incisors are slightly separated, and a wide space exists between the middle pair of lower incisors; the first small premolar in both jaws is placed in the anterior half of the wide space between the canine and second premolar; the last lower molar is scarcely as large as the small lower outer incisor. The mandible is correspondingly slender, and the *symphysis menti* very deep from before backwards, as in the group *Macroglossi* (Plate IV. fig. 3).

Length (of the type specimen), head and body 9″, head 2″·6, ear 1″·2, forearm 5″·4, thumb 2″·1, second finger 3″·9, third finger 11″·5, fifth finger 7″, tibia 2″·6.

Length (of one of the types of *Pt. elseyi*), head and body about 7″, eye from nostril 0″·95, ear 1″·05, forearm 5″·3, thumb 2″·1, second finger 3″·7; third finger—metacarp. 3″·6, 1st ph. 2″·7, 2nd ph. 3″·9; fifth finger—metacarp. 3″·6, 1st ph. 1″·65, 2nd ph. 1″·6; tibia 2″·2, foot 1″·75.

Hab. N.E. Australia (Cape York, Claremont River and Island).

Pt. scapulatus differs so much from all other species of this genus, and resembles the long-tongued *Macroglossi* so closely in the form of the skull and in dentition, that we should expect to find that it feeds on similar fruits, and that the tongue is similarly lengthened and provided with long brush-like papillæ. This, however, cannot be determined from an examination of the specimens hitherto obtained, which are dried skins from which the tongues have been removed.

a. ♀ ad. sk.	N. Australian expedition. (Type of *Pteropus elseyi*, Gray.)		Dr. J. R. Elsey [P.].
b. ♀? ad. sk.	Claremont Island, N.E. Australia.		Dr. J. R. Elsey [P.].
c. ♀ imm. sk.	Claremont Island, N.E. Australia.		Dr. J. R. Elsey [P.].
d. skull of *a*.			
e. imm. skull.			

21. Pteropus macrotis.

Pteropus macrotis, *Peters, MB. Akad. Berl.* 1867, p. 327.
? Pteropus epularius, *Ramsay, Proc. Linn. Soc. New South Wales*, 1877, ii. p. 8.

Ears long, narrow, and attenuated towards the subacute extremities, much longer than the muzzle (Plate III. fig. 3).

Interfemoral membrane very narrow behind, concealed by the fur in the centre; wings about half an inch apart at their origin from the back.

Sides of the face and under surface of lower jaw dark brown, almost black; crown of the head greyish yellow, the bases of the hairs brown, a streak of the same light-coloured hairs extends forwards upon the face between the eyes; back of the head, neck, and shoulders bright pale straw-colour, as in *Pt. keraudrenii*; in front of each shoulder an epaulet of longer and coarser yellow hairs over glands, and the fur across the back of the neck between these glands and around their posterior and superior sides is deeper straw-colour; sides of the neck beneath and breast black, the black fur surrounding anteriorly and inferiorly the bright-coloured tufts on each side; abdomen and sides dark brown, the fur of the centre of the abdomen shorter, and mixed with a few greyish hairs; back behind shoulders dark brown.

Above and beneath, the forearms and legs are naked, and the wing-membrane has only a few long scattered hairs beneath; the bases of the ears in front and behind are alone clothed. Fur across the middle of the back occupying a space about two inches wide.

First upper premolar minute, persistent, in the wide space between the canine and second premolar; first lower premolar about the same size as the last upper molar, all the teeth much smaller and narrower than in any other species, except *Pt. scapulatus*.

The following measurements are taken from the skin of an adult male preserved in alcohol, and are greater than those of the type which I have examined, and believe to be an example of an immature female.

Length, head 2″·5, eye from tip of nostril 0″·85, ear 1″·45 × 0″·7, humerus 4″, forearm 5″·4, thumb 2″, second finger 3″·5; third finger—metacarp. 3″·3, 1st ph. 2″·5, 2nd ph. 3″·6; fourth finger—metacarp. 3″·25, 1st ph. 2″·1, 2nd ph. 2″·1; fifth finger—metacarp. 3″·45, 1st ph. 1″·7, 2nd ph. 1″·6; foot 1″·5.

Hab. Aru Islands; Yule Island, New Guinea.

This species resembles *Pt. alecto* very closely in the colour of the fur, but the ears are much longer and acutely pointed, like those of *Pt. medius*, and the remarkably small size of the premolars and molars not only at once distinguish it from that species, but from every other species of the genus as yet known except *Pt. scapulatus*, in which the teeth are even smaller. The large development of the shoulder-tufts over glands is also noticeable, and this, as well as other corresponding characters, lead us to believe that *Pt. epularius*, P. Ramsay, from Katow, N. Guinea, is identical with this species.

a. ♂ ad. sk., al.	Yule Island, N. Guinea.	Purchased.

22. Pteropus griseus.

Pteropus griseus, *Geoffroy, Ann. du Muséum*, xv. p. 94, pl. 6 (1810); *Peters, MB. Akad. Berl.* 1867, p. 326.
Pteropus pallidus, *Temminck, Monogr. Mammal.* i. p. 184 (1827) (vide *Peters, l. c.*).

Ears rather short, scarcely as long as the muzzle, narrowly rounded off above, the upper third of the outer margin slightly flattened. Wings close together, scarcely half an inch apart at their origin from the back. Interfemoral membrane very narrow in the middle, concealed by the fur.

Head and neck bright yellow, muzzle slightly paler; back blackish brown, mixed with many grey hairs; breast and abdomen greyish yellow, the bases of the hairs black. Younger individuals are darker throughout. Membranes pale brown.

Fur generally short, scarcely extending upon the extremities or upon the wings, occupying a space about an inch wide across the loins, where it is closely appressed.

Teeth as in *Pt. medius*.

Length (of the type specimen), head and body 8″, ear 1″·1, forearm 4″·5, third finger 9″·5, fifth finger 6″·2, tibia 2″·2, foot 1″·5.

Hab. Timor; Banda; (? Sumatra, Malacca, *Temm.*).

Type in the collection of the Paris Museum.

23. Pteropus melanopogon.

Pteropus phaiops, *Temminck, Monogr. Mammal.* ii. p. 65 (1835–41) (excl. i. p. 178).
Pteropus melanopogon, *Schlegel, Peters, MB. Akad. Berl.* 1867, p. 330.
Eunycteris phaiops, *Gray* (in part), *Catal. Monkeys and Fruit-eating Bats*, p. 113 (1870).

Ears shorter than the muzzle, triangular above, with a rounded-off vertical angle. Interfemoral membrane very narrow in the centre. *Wings from the back close to the spine, in old individuals naked across the back* *, or the fur reduced to a narrow longitudinal streak; legs and forearms naked.

Head brownish yellow, brighter yellow between the eyes and on the crown of the head; throat and sides of throat dark brown; neck and shoulders bright yellow, also under surface of neck and anterior part of the breast; breast and abdomen pale yellowish buff, axilla dark brown; above, the line of fur along the spine dark brown with a few greyish hairs. The female is darker throughout.

Skull and teeth as in *Pt. medius*, but the molars much larger.

(For measurements see Table, p. 47.)

Hab. Austro-Malayan Subregion; Celebes (Macassar); Bouru, Amboina, Ceram (Goram, Boano, Manavolka, Saparua, *Peters*).

b. ♀ juv. et ad. sks.	Bouru.	A. R. Wallace, Esq. [C.].
♀ ad. sk.	Ceram.	Purchased.
♀ imm. sk.	Ceram.	A. R. Wallace, Esq. [C.].

* See remarks on this character at the bottom of next page.

Var. α.

Pteropus degener, *Peters, MB. Akad. Berl.* 1876, p. 318.

Under the above name Dr. Peters has described the skin of an old male received by the Berlin Museum from the Aru Islands, which differs from all known specimens of *Pt. melanopogon* and its varieties by the shortness of the ears. The face is clothed with short whitish hairs; crown of the head, neck, throat, breast, and abdomen bright reddish yellow, at the base pale yellow; the whole back is naked, on the rump a few greyish hairs alone appear; the woolly hair on the ventral surface of the antebrachial and wing-membranes reddish yellow.

Total length about 15″; head 3″·8, ear 0″·87 × 0″·6, forearm 7″·75, tibia 3″·4, calcaneum 1″·05, foot 2″·4, skull 3″·6.

This specimen appears to me to agree so closely with *Pteropus melanopogon* in size, in the general colour of the fur, and in the nakedness of the back that I really doubt whether it should be considered a variety, even, on account of the comparative shortness of the ears, which, on the whole, according to the measurements given, are scarcely one fifth of an inch shorter than in typical specimens of *Pt. melanopogon*. The shortness of the ears may well be due, in such an old individual, to a peculiar ulcerative process which often attacks the margins of the ear-conch, causing gradual absorption.

Var. β.

Pteropus melanopogon, *var.* aruensis *et* keyensis, *Schlegel, Peters, MB. Akad. Berl.* 1867, p. 330.

Ears as in the type of *Pt. melanopogon*; fur two inches wide across the middle of the back; interfemoral membrane quite concealed in the centre; legs and forearms nearly naked; head pale yellowish brown, with a few intermixed dark-coloured hairs; neck bright reddish brown above, dark brown on the sides and beneath; back silvery yellowish grey; breast and abdomen yellowish buff, paler posteriorly.

Female specimens are darker, bright reddish beneath, or reddish brown intermixed with buff, and bright bay on the upper surface of the neck; back brownish silvery grey.

From an inspection of the specimens named by Dr. Peters in the Leyden Musem, the writer has satisfied himself that the skins from the Key Islands are examples of the brighter-coloured males of this variety.

These specimens, as well as those in the British Museum collection, have the back well covered, as described above, and the wings appear to arise half an inch apart; whereas in the typical examples of *Pt. melanopogon* the wing-membrane appears to arise much closer to the spine, and the back is quite naked and the fur reduced to a mere line along the spine. These might seem to be quite sufficient differences in structure to lead us to consider this form a distinct species; but the fur of the back evidently disappears with age, and it is impossible in dried specimens to judge of the position of origin

of the wings with much certainty, owing to the stretching undergone by the skin in the drying process. The value of these characters can only be determined by a large series of specimens preserved in alcohol, which no museum as yet possesses.

(For measurements see Table, p. 47.)

a. ♀ ad. sk. Aru Islands. A. R. Wallace, Esq. [C.].

Var. γ.

Pteropus melanopogon, *var.* neohibernicus, *Peters, MB. Akad. Berl.* 1876, p. 317.

I have not seen the specimens described under this name by Dr. Peters, who remarks that they agree so closely in the form of the ears, in the proportional measurements of parts, in the development of the volar membranes, in the fur, and in the form of the skull with the typical examples of *Pt. melanopogon* from Celebes and Amboina that it is impossible to separate them from that species. They differ, however, in the colour of the fur, of which the following description is given :—

In the male the face and forehead is dark reddish brown, nape of the neck reddish, neck paler, back darker, breast and abdomen lighter reddish brown. Hair covering the antebrachial and wing-membranes along the sides of the body beneath reddish.

In the female the face is paler, more yellowish red, also the nape of the neck, breast, and abdomen ; neck and back still more yellowish, palest posteriorly.

Ear 1″·1, forearm 5″.

The above measurements show that these specimens are much smaller than typical examples of *Pt. melanopogon*, and they are therefore probably immature.

The collection possesses a specimen of a nearly adult male of this species, which was obtained in Duke of York Island, near the coast of New Ireland, whence came the types of Dr. Peters's variety described above. This specimen is very much larger, nearly as large as full-grown specimens of *Pt. melanopogon* from Ceram, but agrees so closely in other respects with the New-Ireland forms, that I have no hesitation in placing it under the same name. It differs, however, in having slightly shorter ears, and an index finger exceeding in its proportional length not only that of every other specimen of this species as yet known (see measurements below), but also those of every species of the genus. This may, however, be an individual peculiarity, and I hesitate, in the absence of other specimens, to ascribe any value to it. The fur is dark reddish brown, with a slightly greyish tinge, on the face, between the eyes, and under the jaws ; head, neck, shoulders, and the whole under surface of the body bright reddish brown, with a yellowish tinge, the hairs paler and more yellowish towards the base ; on the back dark brown, intermixed with bright sulphur-yellow, which replaces the brown across the loins ; interfemoral membrane with longer, dark brown, almost black hairs.

The wings arise close together from the sides of the back, and the fur along the back is scarcely more than an inch in width at its widest part.

The canine and second upper premolar are separated by a narrow space, also in the lower jaw, where the first premolar nearly fills up the space between.

In the following Table the measurements of the above-described specimen are placed in the first column; in the second those of *Pt. melanopogon* from Bouru Island; in the third those of *Pt. melanopogon*, var. *aruensis*; while in the fourth the few measurements of *Pt. degener* given by Dr. Peters are exhibited:—

	I.	II.	III.	IV.
Length of head	3·7	...	...	3·7
,, ear	1·0	1·0	1·0	0·87
,, forearm	7·0	7·75	7·3	7·7
,, second finger	5·6	5·5	5·45	...
,, third finger, metacarp.	4·75	5·2	5·1	...
,, ,, 1st ph.	3·65	3·8	3·6	...
,, ,, 2nd ph.	5·6	6·3	5·5	...
,, fifth finger, metacarp.	4·9	5·25	5·2	...
,, ,, 1st ph.	2·4	2·5	2·25	...
,, ,, 2nd ph.	2·1	2·4	2·0	...
,, tibia	3·3	3·3	...	3·4
,, calcaneum	1·1	...	...	1·1
,, foot	2·4	...	...	2·4

a–d. ♂ & ♀ imm. et ad. sks. Duke of York Island. Rev. G. Brown [C.].

24. Pteropus chrysoproctus.

Pteropus chrysoproctus, *Temminck, Monogr. Mammal.* ii. p. 67 (1835–41); *Peters, MB. Akad. Berl.* 1867, p. 331.
Pteropus argentatus, *Gray, Voy. 'Sulphur,' Mammalia*, p. 30 (1844).

Ears longer than the muzzle; general shape as in *Pt. medius*, rather broader in the upper third and more abruptly narrowed and subacutely pointed. Wings close together at origin from the sides of the back, scarcely half an inch apart. Interfemoral membrane short, but its free margin in the centre is not concealed by the fur.

The whole body, except half the back, is covered with bright reddish-yellow fur, which is darker under the chin and on the chest and abdomen; anterior half of the back reddish brown. In the type of *Pt. argentatus*, Gray (a not full-grown male), the back is darker brown, with a few intermixed yellowish hairs.

Although the wings are so close together at their origin, the fur covering the middle of the back is nearly two inches in width and rather long.

Teeth as in *Pt. medius*, which this species also closely resembles in the form of the skull.

Length (of the type specimen), head and body about 9″, ear 1″·2, eye from tip of nostril 0″·8, forearm 6″·5, thumb 3″·1; third finger—metacarp. 4″·5, 1st ph. 3″·6, 2nd ph. 5″·4; fifth finger—metacarp. 4″·8, 1st ph. 2″·1, 2nd ph. 2″; tibia 2″·9, foot 1″·8.

Hab. Amboina, Ceram, Goram, Pulo Pandjamb (*Peters*).

a. ♂ imm., al. Moluccas. Sir E. Belcher [C.].
(Type of *Pteropus argentatus*, Gray.)
b. ♂ ad. sk. ? Matabello Island. A. R. Wallace, Esq. [C.].

25. Pteropus pteronotus.

Eunycteris phaiops, *Gray* (in part), *Catal. Monkeys and Fruit-eating Bats*, p. 113 (1870).

Muzzle long and narrow; ears longer than the muzzle, abruptly narrowed and attenuated in upper third. Interfemoral membrane nearly one inch deep in the centre, where it forms an acute angle. Wings arising close together, scarcely a quarter of an inch apart at the spine, but the fur extends outwards upon them for more than half an inch each side.

Colour of the fur like that of *Pt. edulis*; head reddish yellow, under surface of the muzzle and throat dark reddish glistening brown; back of the neck and shoulders bright yellow, brightest on the shoulders; back reddish brown; rump dark brown, with a few shining yellowish hairs.

Fur generally short, much longer on the neck than anywhere else, on the back occupying a space scarcely two inches wide; the humerus and forearm have a few very short hairs; the interfemoral membrane is partially covered above, its posterior half naked; tibiæ naked above and beneath, the thighs covered almost as far as the knees on both surfaces.

Teeth as in *Pt. edulis*, except that the upper incisors are more slender and the minute first upper premolar is persistent; the lower middle incisors are separated by an interval.

The following Table exhibits the relative measurements of this species (No. I.) and of two specimens of *Pt. chrysoproctus*—the type specimen (a dried skin), preserved in the Leyden Museum (No. II.), and the type of *Pt. argentatus*, Gray, preserved in alcohol (No. III.).

	I.	II.	III.
Length, head and body, about	9·0	8·5	7·5*
,, head	3·0	...	2·4
,, ear	1·5	1·2	1·2
,, eye from tip of nostril	1·2	0·8	0·8
,, forearm	7·2	6·5	5·2
,, thumb	3·0	3·1	2·4
,, second finger	5·2	...	3·9
,, third finger, metacarp.	4·5	4·5	3·4
,, ,, 1st ph.	3·5	3·6	2·5
,, ,, 2nd ph.	5·1	5·4	3·9
,, fifth finger, metacarp.	4·75	4·8	3·6
,, ,, 1st ph.	2·3	2·1	1·55
,, ,, 2nd ph.	2·3	2·0	1·55
,, tibia	3·5	2·9	2·3
,, calcaneum	1·3	...	0·75
,, foot	2·4	1·8	1·8

* Not full-grown.

Comparison of the above measurements shows that while this species exceeds *Pt. chrysoproctus* very considerably in the length of the muzzle, ears, forearms, tibiæ, and feet, the latter has the bones of the middle finger longer. This could not be the case if *Pt. pteronotus* represented only the more adult form of *Pt. chrysoproctus*, for, in all Bats, while the ears and feet attain their full size when the animal is still young, the bones of the wings are the last parts of the body to reach their full length.

This species, therefore, differs from *Pt. chrysoproctus*, to which it is most nearly allied, in the greater length of the parts referred to above, in the different colour of the fur, in the narrower and much longer muzzle, in the presence of the small first upper premolar in adult individuals, and in the remarkable development of the interfemoral membrane behind, which is equalled only by *Pt. edulis* from the same locality.

a. ♀ ad., al. Java. J. Bowring, Esq. [P.].

26. Pteropus edulis.

Pteropus edulis, *Geoffroy, Ann. du Mus.* xv. p. 90 (1810); *Temminck, Monogr. Mammal.* i. p. 172, ii. p. 58; *Peters, MB. Akad. Berl.* 1867, p. 324; *Dobson, Journ. Asiat. Soc. Beng.* 1873, p. 197, pl. xiv. fig. 1 (ear); *Monogr. Asiat. Chiropt.* p. 20 (1876).
Pteropus javanicus, *Desmarest, Mammalogie*, p. 109 (1820).
Pteropus funereus, *Temminck, l. c.* ii. p. 63 (1835–41).

Ears much longer than the muzzle, naked, acutely pointed; the length of the ear-conch nearly double its greatest width, the upper third of the outer margin concave beneath the tip.

Wings from the sides of the hairy back, quite 2 inches apart at their lines of attachment; interfemoral membrane about an inch deep in the middle, not concealed by the fur.

Back of the head, neck, and shoulders clothed with moderately long and dense erect fur; from the shoulders backwards the fur is short, closely appressed, and directed backwards, occupying a space (in full-grown specimens) nearly 4 inches in width across the middle of the back. The extremities are nearly naked; a narrow line of very short fur passes outwards upon the wing-membrane behind the humerus for about half its length, and a few short hairs cover a narrow portion of the wing-membrane along the posterior margin of the forearm. The thighs, and the interfemoral membrane as far as a line corresponding to the position of the semicircular band on its inferior surface, are thinly covered, the posterior free margin of the membrane is quite naked. On the under surface the wing-membrane is covered with thinly spread rather long fur, which extends outwards as far as a line drawn from the knee to a point about 1 inch posterior to the elbow, thence behind the forearm for two thirds its length; the thighs are partially covered, the legs and the interfemoral membrane are quite naked.

Colour of the fur variable, brighter in males than in females, generally dark reddish brown on the face and under surface; head

and nape of neck more or less bright bay; back black, with several greyish shining hairs. The colour of the fur of the head, nape of neck, and shoulders varies from reddish brown to bright reddish yellow, in some female specimens even dark reddish brown, as in the type of *Pt. pluto*, Temminck, where the fur of the head and body generally is deep black.

A specimen of an apparently adult female (with much-worn teeth), from the Andaman Islands, given to the writer by Mr. Francis Day (with forearm only 6″·5 long), has the fur very short throughout, and the wings, interfemoral membrane, and extremities almost devoid of hair; the head, under surface of the lower jaw, and throat very dark reddish brown, with some intermixed greyish or shining hairs; the back of the head, nape of neck, and shoulders reddish yellow, the breast and abdomen reddish brown; upper and lower incisors slender, cylindrical.

Skull with very prominent sagittal and occipital crests in old individuals, in which, also, the ligamentous tissue connecting the extremity of the long postorbital process with the corresponding process from the zygomatic arch often becomes cartilaginous, so that the orbit appears on a superficial examination to be completely surrounded by bone; upper incisors close together, nearly equal in size; lower incisors occupying the space between the canines, the central pair not separated, scarcely more than half the size of the outer incisors; first upper premolar very small, deciduous; the second premolar widely separated from the canine; premolars and molars, in both jaws, much longer than broad, without basal projections, their inner cusps feebly developed, quite disappearing in full-grown individuals; last upper molar larger than the first lower premolar, which stands in the centre of the space between the canine and second premolar, and which, again, is larger than the last lower molar.

(For measurements see Table, p. 55.)

Hab. Indo-Malayan Subregion, extending also into some of the islands of the northern part of the Austro-Malayan Subregion. (Andaman and Nicobar Islands, Sumatra, Java, Borneo, Philippine Islands (Samar Island), Banda, Ternate, Timor.)

This is the largest known species of the genus, and therefore the largest known species of the order; the forearm of full-grown individuals exceeds that of the next largest species (*Pt. melanopogon*, *Pt. jubatus*, and *Pt. medius*) by at least 1 inch; the fully extended wings measure quite 5 feet across. Skulls of immature animals of *Pt. edulis*, with undeveloped sagittal crest, are larger than those of old individuals of *Pt. medius*, which they closely resemble in other respects. Young specimens of this species may generally be easily distinguished by the much greater depth of the interfemoral membrane in the centre than in any other species with similarly long and pointed ears.

a. ♀ ad. sk.	Java.	
b–e. ♂ & ♀ juv., al.	Isles of Kallam, Straits of Malacca.	Secretary of State for India [P.].

f. ♀ juv., al.	Dinagut Island, Philippines.	Mr. Everett [C.].
g. ♂ imm., al.		M. Lidth de Jeude.
h. ♂ imm. sk.		St. G. Mivart, Esq. [P.].
i. skull.		Dr. T. Oldham [P.].
j. skull.		
k, l. skulls.		Zool. Soc. Coll.
m, n. skulls.		M. Lidth de Jeude.

27. Pteropus medius.

Pteropus edwardsii, *Geoffroy* (in part), *Ann. du Mus.* xv. p. 92 (1810).
Pteropus medius, *Temminck, Monogr. Mammal.* i. p. 176 (1827); *Peters, MB. Akad. Berl.* 1867, p. 325; *Dobson, Journ. Asiat. Soc. Beng.* 1878, p. 196, pl. xiv. fig. 1 (ear); *Monogr. Asiat. Chiropt.* p. 18 (1876).
Pteropus leucocephalus, *Hodgson, Journ. Asiat. Soc. Beng.* 1835, p. 699.
Pteropus assamensis, *M'Clelland, P. Z. S.* 1839, p. 148.
Pteropus edwardsi, *Jerdon* (non *Geoffr.*), *Mammals of India*, p. 18 (1867); *Hutton, Peters, P. Z. S.* 1872, p. 691.
Pteropus kelaartii, *Gray, Catal. Monkeys and Fruit-eating Bats*, p. 104 (1870).

Very similar to the preceding species in the general form, but distinguished by its conspicuously smaller size, proportionately longer and broader ears, by the distribution and colour of the fur, by the position of attachment of the wing-membrane, which arises from the sides of the body comparatively closer to the spine, and by the less development of the interfemoral membrane in the centre.

The fur of the body is longer than in *Pt. edulis*, especially on the back and on the interfemoral membrane, and extends further along the posterior extremities; but on the wing-membrane beneath, between the anterior and posterior extremities, it is much shorter than in that species.

Face and throat reddish brown; crown of the head brighter reddish brown; nape of neck and shoulders varying from bright reddish yellow to pale buff; back dark reddish brown (colour of cocoanut-fibre), becoming lighter towards the rump; under surface of neck, and the greater part of the breast and abdomen, varying from bright bay to pale reddish yellow; sides of the body beneath the wings and round the pubis dark reddish brown; on each side of the neck a circular tuft of rigid unctuous hairs, of a reddish-yellow colour, covering glands, as in *Pt. edulis*.

Teeth as in *Pt. edulis*; the skulls, also, of the two species are scarcely distinguishable except by size, those of immature specimens of *Pt. edulis* with bifid sagittal crest are considerably larger than skulls of old individuals of this species.

In one of the types of *Pt. leucocephalus*, Hodgson, from Nipal, there is an abnormal additional upper molar immediately behind the third molar, about the size of one of the outer lower incisors, the antepenultimate molar (the last molar in all other specimens) being similar to the corresponding tooth in other examples of *Pt. medius*.

The other specimens of *Pt. leucocephalus* do not differ in any other respect from this one, and all agree in structure and in the general colour of the fur (though the head, neck, and under surface are paler than usual) with other examples of *Pt. medius*.

Specimens from Ceylon appear somewhat larger than those from the peninsula of India; and the greater width of the intercanine space, in an old individual from that locality, led Dr. Gray to make it the type of *Pt. kelaartii*, which does not differ from specimens of *Pt. medius* from that continent in any respect except size, the intercanine space being wider in proportion to its greater size.

(For measurements see Table, p. 55.)

Hab. Peninsula of India, Ceylon, Arracan, Burma. The westward limit of this species in the peninsula of India corresponds closely to the course of the river Indus *, whence it extends eastwardly throughout every part of the peninsula south of the Punjab and the Himalaya; its eastward limit appears to be Burmah, south or east of which country it has not hitherto been found, its place being taken in the Malay Peninsula and in the Andaman and Nicobar Islands by *Pt. edulis*, to which it is very closely allied.

Pt. medius is the only species of the genus as yet known to inhabit the peninsula of India. Specimens from Kachh, Madras, and Bengal exhibit on comparison no appreciable difference. Wherever fruit is abundant these Bats (the "Flying Foxes" of Europeans resident in India) are to be found; and when food becomes scarce in the neighbourhood of their accustomed haunts they often travel great distances to obtain it, returning invariably to their sleeping-places about sunrise. Thus Captain Hutton mentions that they make nightly visits to the fruit-gardens of the Dehra Doon below Mussooree in the Himalayas from the middle of August to the end of September, performing a journey of from 25 to 30 miles at the least.

a. ♂ ad. sk.	Pachora, Bombay.	
b. ♂ ad., al.	Nipal.	B. H. Hodgson, Esq. [P.].
c–e. ♂ ad. sks.	Nipal.	B. H. Hodgson, Esq. [P.].
f. ad. sk.	Assam.	
g–j. ♀ ad. sks.	India.	
k, l. ♀ ad. sks.	? India.	
m. ♂ ad. sk.	India.	
n. ♀ ad. sk.	Ceylon.	Captain J. Stevens [P.].
	(Type of *Pteropus kelaartii*, Gray.)	
o. ♀ ad. sk.	Ceylon.	Zool. Soc. Coll.
p, q. ♀ ad. sks.	No history.	
r. ♂ skeleton.		
s. imm. skeleton.		
t–v. skulls of *c–e*.		
w–z. skulls.	Bengal.	General Hardwicke [P.].
a'. skull.	Nipal.	B. H. Hodgson, Esq. [P.].

b'. skull of *b*. (with additional posterior upper molars).

* Dr. Bowman, H.M.'s Indian Army, informs the writer that he saw a colony of this species in the second range of hills in Kelat, beyond the mouth of the Indus, and that they extend as far north as the first pass, about sixty miles.

c', *d'*. imm. & ad. skulls. *e'*. ad. skull of *n*. *f'*. ad. skull. *g'*, *h'*. ad. skulls. *i'*. ad. skull.	Madras.	Sir Walter Elliot [P.]. Zool. Soc. Coll.

28. Pteropus edwardsii.

Pteropus edwardsii, *Geoffroy* (in part), *Ann. du Mus.* xv. p. 92 (1810); *Peters, Reise nach Mossambique*, p. 23.
Pteropus phaiops, *Temminck, Monogr. Mammal.* i. p. 178 (1827); *Peters, MB. Akad. Berl.* 1869, p. 392.

Slightly smaller than *Pt. medius*, but resembling that species closely in the form of the head and ears, and generally in the colour and distribution of the fur.

The ears are, however, considerably shorter, and the face and under surface of the lower jaw are deep black, not reddish brown as in *Pt. medius*; crown of the head and nape pale reddish yellow to pale buff, collar reddish yellow to pale yellow, chest and abdomen varying from pale yellow to reddish yellow, the sides of the body beneath the wings dark reddish brown, as in the preceding species; back black, the hairs short and closely appressed and mixed with more or less greyish hairs. In females the fur appears to be redder and darker throughout.

The fur on the chest and abdomen appears to be longer, and that on the face shorter than in *Pt. medius*; on the upper surface the legs are clothed as far as the knees, the hairs thinning out towards the knees; on the forearm the fur is thin and flat, as in the Indian species.

The wings appear to arise closer to the spine than in *Pt. medius*, and the fur clothing the back in this position occupies a narrower space.

Teeth very similar to those of *Pt. medius*; but in young specimens the second and third premolars, in both jaws, have a small posterior basal process, which, however, soon becomes worn away. I have not been able to find any other important differences between the teeth of these two species, which agree very closely in the shape and relative measurements of their skulls, as the following Table shows:—

	Pt. medius.	*Pt. edwardsii.*
Extreme length	2·9	2·7
Breadth across zygomatic arches	1·7	1·5
From the postorbital foramen to the anterior extremity of the nasal bones	1·3	1·2
From the postorbital foramen to the occipital crest	1·75	1·55
From the anteorbital foramento the anterior extremity of the nasals	0·95	0·9
Length of the bony palate	1·45	1·35
Width of ditto	0·7	0·65
Space occupied by the last four upper molars	0·8	0·75

(For general measurements see p. 55.)

Hab. Seychelle Islands, Comoro Islands, Madagascar.

a. ♂ imm., al.	Seychelle Islands.	Dr. E. P. Wright [C.].
b. ♀ imm. sk.	Mohilla Island (Comoros).	Dr. Kirk [C.].
c. sk.	Johanna Island (Comoros).	Dr. Livingstone [P.].
d. ♀ ad. sk.	Johanna Island.	John Barrow, Esq. [P.].
e. ♂ ad. sk.	Johanna Island.	Purchased.
f–k. imm. et ad. sks.	Johanna Island.	Purchased.
l. ad. sk.	Vohima, Madagascar.	Purchased.
m, n, ad. sks.	Madagascar.	Purchased.
o, p. ♂ ad. sks.		
q. skeleton.	Madagascar.	Purchased.
r. skull of *l.*		
s. skull.	Vohima, Madagascar.	Purchased.
t. skull.	Mohilla Island (Comoros).	Dr. Kirk [C.].

29. Pteropus nicobaricus.

Pteropus nicobaricus, *Fitzinger, Sitzungsber. Wien. Akad.* 1860, p. 389 (not described); *Zelebor, Reise der öster. Freg. Novara, Säugeth.* 1868, p. 11; *Dobson, Journ. Asiat. Soc. Beng.* 1873, p. 198, pl. xiv. fig. 2 (ear); *Monogr. Asiat. Chiropt.* p. 17, fig. (head) (1876).

Pteropus melanotus, *Blyth, Catal. Mammal. Mus. Asiat. Soc. Beng.* p. 20 (1863) (not described).

Pteropus condorensis, *Peters, MB. Akad. Berl.* 1869, p. 393.

About the size of *Pt. medius*, which it also resembles closely in the form of the head and body, but is at once distinguished by the much shorter and differently shaped ears. Ear-conch rounded off above, the upper third of its outer margin slightly flattened, not concave, the lower two thirds convex; in full-grown individuals the greatest diameter of the opening of the external ear, from the point of junction of the outer and inner margins below to the tip of the ear above, scarcely exceeds one inch.

The distribution of the fur is similar to that of *Pt. medius*; but the hair on the wing-membrane is very much shorter.

In some male specimens the colour of the fur also corresponds to a certain extent with that of *Pt. medius*; generally, however, the lighter-coloured portions of fur on the nape of the neck, and on the shoulders and chest, are of a deeper hue than in the latter species, usually dark ferruginous red or chestnut; females and young males are commonly *intensely black throughout*; in some female specimens the position of the light-coloured tippet in the male is indicated by a reddish tinge of the black hair.

The skull differs from that of *Pt. medius* in being shorter, wider across the maxillary and nasal bones. The distance between the small anterior upper premolars of opposite sides exceeds that in *Pt. medius* by one tenth of an inch. The *foramen ovale* is divided in the centre by a process of bone; in *Pt. medius* it is undivided. A postorbital process of the zygomatic arch is present, though not so well defined as in *Pt. medius*.

The mandible is shorter and its rami deeper than in *Pt. medius*: the coronoid process is more developed vertically; its posterior

margin is nearly straight, not deeply concave; and its superior angle is narrowly, not broadly, rounded off, as in the latter species.

The teeth are stouter in *Pt. nicobaricus*; but their general characters are the same in both species.

(For measurements see below.)

I have examined the type of *Pt. condorensis*, Ptrs., which is preserved in the collection of the Paris Museum. The unconsolidated condition of the epiphyses of the finger-bones shows that the specimen is immature; and this explains why the last upper molar lies almost quite behind the root of the zygomatic process, as described by Dr. Peters. The head, neck, chest, and abdomen are dark reddish brown, the back and sides of the abdomen black, the fur of the back with a few greyish or shining hairs. The ears appear rather more rounded off than in specimens of *Pt. nicobaricus* from the Andamans and Nicobars. On the whole I believe *Pt. condorensis* can only be considered a local variety of this species.

Hab. Andaman and Nicobar Islands; Java; Pulo Condor.

a. ♀ imm. sk.	Ross Island.	R. G. Wardlaw-Ramsay, Esq. [P.].
b. ad., al.	Nicobar Island.	Indian Museum, Calcutta [E.].

The following Table exhibits the relative measurements of the species of *Pteropus* described in the foregoing six pages:—

	Pt. edulis.	*Pt. medius.*	*Pt. edwardsii.*	*Pt. nicobaricus.*
Length, head and body	12·0	9·0	8·7	9·0
„ head	4·0	3·1	2·9	3·0
„ ear	1·75	1·5	1·25	1·05
„ eye to tip of nostril...	1·5	1·3	1·1	1·15
„ forearm	8·8	6·6	6·1*	6·5
„ thumb	4·0	2·7	2·5	2·8
„ third finger	16·5	12·5	11·9	12·5
„ fifth finger.....	11·3	8·5	8·1	8·5
„ tibia	4·3	3·0	2·7	3·0
„ foot	3·3	2·3	2·0	2·0

30. Pteropus livingstonii.

Pteropus livingstonii, *Gray, P. Z. S.* 1866, p. 66; *Catal. Monkeys and Fruit-eating Bats*, p. 109 (1870).

Pteropus edwardsii, *Peters* (*non Geoffroy*), *MB. Akad. Berl.* 1867, p. 325.

Ears quite different in shape from those of any other known species of *Pteropus*; upper half of the ear-conch almost quite circular, the outer and inner margins forming part of the same semicircle above (Plate III. fig. 5).

Interfemoral membrane narrow behind, concealed by the fur.

Head and upper and lower surface of the body intensely shining black throughout, with the exception of a small tuft of long bright yellow hairs on each shoulder, and a few long yellowish shining hairs among the long fur covering the rump; beneath, the posterior part of the abdomen with a few intermixed reddish-yellow hairs.

* One specimen from Madagascar has the forearm 6·5 inches.

The fur is altogether much longer and more woolly on the head, neck, and shoulders, and inferior surface of the body than in *Pt. edwardsii*, and across the back occupies a space nearly three inches wide, leaving the anterior extremities nearly naked; but the thighs are well covered, and a few hairs extend upon the tibiæ, while the interfemoral is quite concealed by the long fur in the middle.

Teeth as in *Pt. edwardsii*; lower incisors distinctly grooved.

The single type specimen, a skin in indifferent condition, affords the following measurements only:—Length of ear 1″·2, breadth of ear 0″·8; length of third finger—metacarp. 4″, 1st ph. 3″·5, 2nd ph. 5″·1; fifth finger—metacarp. 4″, 1st ph. 2″·3, 2nd ph. 2″·3.

On the whole this species appears to correspond closely in size with *Pt. edwardsii*, from which the shape of the ears and the quality, colour, and distribution of the fur at once distinguish it.

Hab. Johanna Island, Comoro group.

a. ad. sk. (type). Johanna Island. Dr. Livingstone [P.].

31. Pteropus alecto.

Pteropus alecto, *Temminck, Monogr. Mammal.* ii. p. 75 (1835–41); *Peters, MB. Akad. Berl.* 1867, p. 329.

Pteropus aterrimus, *Temminck, Coup d'œil Gén. sur les Poss. Néerland.* i. p. 333.

Pteropus chrysauchen, *Peters, MB. Akad. Berl.* 1862, p. 576.

Pteropus mysolensis, *Gray, Catal. Monkeys and Fruit-eating Bats*, p. 105 (1870).

Ears shorter than the muzzle, conical, obtusely pointed, the outer margin of the conch flatly emarginate in upper third.

Interfemoral membrane narrow in the centre, but the posterior margin is visible through the fur; wings from the sides of the back, about one and a half inch apart across the loins.

Face dark reddish, the crown of the head with numerous grey hairs; nape of the neck and shoulders bright yellow, back like crown of head; beneath, the reddish collar is continued round the neck intermixed with black and yellowish-grey hairs; chin and throat like head; breast and abdomen dark brown, almost black, with some solitary grey hairs.

The fur scarcely extends upon the membranes or extremities above; beneath, the wing-membrane between the humerus and femur is covered with dark brown woolly hair.

Teeth as in *Pt. medius*, but much larger in all dimensions; lower incisors grooved, the inner incisors about half the size of the outer ones, and separated in the centre; first upper premolar deciduous.

Length (of an adult ♂), head and body 9″·5, ear 1″·05, eye from tip of nostril 1″·3, forearm 7″, thumb 2″·8, second finger 5″·4; third finger—metacarp. 4″·8, 1st ph. 3″·6, 2nd ph. 6″; fifth finger—metacarp. 4″·9, 1st ph. 2″·2, 2nd ph. 2″·2; tibia 3″, calcaneum 0″·9, foot 2″·2.

Hab. Celebes, Ternate, Gebeh, Morty, Batchian, Mysol, Ceram, Pinou Island (Macluer Bay, N. Guinea).

This species resembles *Pt. nicobaricus* in the colour of the fur and in size, but the differently shaped ears and much larger premolars and molars at once distinguish it.

a.	♀ imm. sk.	Ternate.	A. R. Wallace, Esq. [C.].
b.	♂ nearly ad. sk.	Batchian Island.	A. R. Wallace, Esq. [C.].
c, *d*.	♂ & ♀ imm. sk.	Batchian Island.	Purchased.
e.	♂ ad. sk.	Batchian Island.	Purchased.
f.	♀ imm. sk.	Mysol Island.	A. R. Wallace, Esq. [C.].
		(Type of *Pteropus mysolensis*, Gray.)	
g.	♂ imm. sk.	Ceram.	A. R. Wallace, Esq. [C.].

32. Pteropus hypomelanus.

Pteropus hypomelanus, *Temminck, Esquiss. Zoolog. sur la côte de Guiné*, p. 61 (1853); *Wagner, Suppl. Schreb. Säugeth.* v. p. 599 (1857); *Peters, MB. Akad. Berl.* 1867, p. 330.

Pteropus tricolor, *Gray, Catal. Monkeys and Fruit-eating Bats*, p. 108 (1870).

Ears about as long as the muzzle, obtusely pointed, rather broad, in some specimens triangularly rounded off above; the inner and outer sides of the basal half of the concave surface of the conch with a tuft of rather long hairs; interfemoral membrane short, about 0″·3 deep in the centre, concealed by the fur behind; wings nearly one inch apart at their origin from the sides of the back.

The colour of the fur appears to vary considerably. In an apparently adult female the face and crown of the head are silvery grey, with some intermixed dark hairs; sides of the face and under surface of the muzzle reddish brown and grey mixed; back of the head, neck above and beneath, and shoulders yellowish; chest and abdomen yellowish buff, sides of the body beneath the wings reddish brown. Fur of the back very short, black-brown, with shining extremities, slightly reddish brown on rump. This is the general colour of specimens from Ternate.

A younger individual from Banda has the head and neck brownish yellow, the head darker than the neck and with a greyish tinge, shoulders passing into yellowish buff; back greyish brown; chest and abdomen yellowish brown, paler in front and behind; fur extending upon half the inner sides of the tibiæ.

A nearly adult male from Dinagat Island, S.E. Philippines, in the collection, has the face yellowish brown, with intermixed black hairs; the crown of the head bright yellowish buff; the collar ferruginous red; the shoulders as the crown of the head; the throat black, the breast and abdomen as the shoulders; the sides of the body and thighs dark brown, back similar, paler behind; hairs of the back rather long, scarcely appressed; the greater part of the interfemoral clothed with long fur, which extends upon the inside of the tibiæ halfway to the ankles.

In most specimens the forearms and legs are almost naked, and the wing-membrane beneath is clothed with rather short fur between the humerus and femur and along the forearm.

Skull and dentition very similar to that of *Pt. medius* (which this species also resembles in the general colour of the fur), but the back teeth are larger. Upper incisors well developed, close together, and equal; in one specimen (in the Leyden Museum) the outer upper incisors on each side are broader and shorter than the inner incisors and bifid; inner lower incisors separated by a narrow space, about one third the size of the outer incisors; no trace of the first upper premolar; last molar about equal to the last lower molar, which again is nearly equal to the first lower premolar, which occupies the centre of the space between the canine and second premolar; the antepenultimate upper molar is narrow, but considerably exceeds in antero-posterior diameter the preceding molar; the last upper molar has an almost circular crown, and is placed towards the inner side of the tooth-row.

Postorbital process very long, nearly meeting the well-developed corresponding process from the zygoma.

Length (of the type specimen), forearm 4″·7, thumb 2″·1, second finger 3″·4; third finger—metacarp. 3″·2, 1st ph. 2″·35, 2nd ph. 3″·45; fifth finger—metacarp. 3″·1, 1st ph. 1″·35, 2nd ph. 1″·25; tibia 2″, foot 1″·7.

Length (of an adult ♀ from Philippine Islands), head and body 7″·5, head 2″·6, ear 0″·95, eye from tip of nostril 1″, forearm 5″·4, thumb 2″, second finger 3″·7; third finger—metacarp. 3″·4, 1st ph. 2″·6, 2nd ph. 4″·1; fifth finger—metacarp. 3″·7, 1st ph. 1″·55, 2nd ph. 1″·65; tibia 2″·15, foot 1″·8.

Hab. Borneo *, Philippine Islands, Sangir Island, North Celebes, Ternate, Banda, New Guinea.

This species resembles *Pt. medius* in the colour of the fur probably more closely than any other species except *Pt. edwardsii* from Madagascar, but is at once distinguished by the differently shaped and much shorter ears and by its conspicuously smaller size. The premolar and molar teeth are much broader and altogether larger, and the last upper molar is placed towards the inner side of the tooth-row.

a–c.	♀ juv. et im. & ♂ ad., al.	Dinagut Island, S.E. Philippines.	Mr. Everett [C.].
d.	♀ ad., al.	Philippine Islands.	Zool. Soc. Coll.
e.	♀ ad., al.	Philippine Is. (Luzon).	Dr. Meyer [C.].
f, g.	♂ ad. sks.	Sangir Island.	Purchased.
h.	ad., al.	North Celebes.	Dr. A. B. Meyer [C.].
i.	♀ imm. sk.	Ternate. (Type of *Pteropus tricolor*, Gray.)	A. R. Wallace, Esq. [C.].
j.	♀ ad. sk.	New Guinea (south of Huon Gulf).	Dr. P. Comrie [C.].

33. Pteropus tuberculatus.

Pteropus tuberculatus, *Peters, MB. Akad. Berl.* 1869, p. 393.

Ears shorter than the muzzle, their basal half externally clothed

* *Vide* Peters, MB. Akad. Berl. 1868, p. 626.

with hairs; interfemoral membrane narrow, concealed in the middle by the fur.

General colour of the fur reddish brown; muzzle and head pale yellowish brown; back reddish brown with paler extremities.

Distribution of the fur as in *Pt. macklotii*.

The incisors and the first lower premolar are much larger than in *Pt. macklotii*, and the first upper premolar is not deciduous; the last upper molar is also much smaller, the antepenultimate molar perceptibly narrower, and the second and third upper premolars have each a posterior and external basal cusp.

Length (of the type specimen), head and body 6″·5, head 2″·2, eye from nose 0″·8, ear 0″·68 × 0″·48, forearm 4″·8, thumb 1″·9; third finger—metacarp. 3″·2, 1st ph. 2″·5; 2nd ph. 4″; fifth finger —metacarp. 3″·5, 1st ph. 1″·5, 2nd ph. 1″·6; tibia 1″·9, calcaneum 0″·5, foot 1″·7.

Hab. ——?

Type in the collection of the Paris Museum.

The above is taken from the original description of the species by Dr. Peters, as I have not yet seen the type, having unfortunately overlooked it on each of my visits to the Paris Museum.

34. Pteropus fuscus.

Ears much shorter than the muzzle, oval, rounded off above, the upper third of the outer margin flattened; ear-conch almost naked.

Interfemoral membrane very short behind, concealed by the fur. Sides of the face and under surface of the muzzle and throat black or very dark brown; crown of the head dark reddish brown; neck and shoulders dark reddish or ferruginous brown, but slightly paler than the head; back dull greyish brown (almost the colour of a dead leaf), contrasting with the deep reddish brown of other parts; neck beneath, breast, and abdomen dark brown, with some shining hairs; a darker-coloured patch of fur beneath the origin of the antehumeral membrane on each side.

Fur rather short throughout, the fur of the neck slightly longer than that of the breast and abdomen; on the back short, appressed; above, the forearm and tibiæ are naked; beneath, the wing-membrane between the humerus and femur is thinly covered, and a band of fur extends outwards behind the forearm.

Teeth generally similar to those of *Pt. hypomelanus*, but larger, and the posterior upper molar is quite differently shaped, being oblong, its longitudinal greatly exceeding its transverse diameter, and is placed obliquely in the tooth-row, its posterior margin directed inwards and backwards; inner lower incisors separated by a narrow space, half the size of the outer incisors; first upper premolar deciduous; first lower premolar in the centre of the space between the canine and second premolar, and larger than the last lower molar.

. Length, head and body about 8″, ear 0″·8, eye from nostril 1″, length of lower tooth-row 1″·3, forearm 5″·7, thumb 2″·4; third

finger—metacarp. 3″·8, 1st ph. 2″·9, 2nd ph. 4″; fifth finger—metacarp. 3″·9, 1st ph. 1″·8, 2nd ph. 1″·85; tibia 2″·5, foot 2.

Hab. Celebes.

a. ♂ ad. sk. (type).	Celebes.	Purchased.

35. Pteropus gouldii.

Pteropus funereus, *Gould* (non *Temminck*), *Mammals of Australia*, iii. pl. 30.

Pteropus gouldii, *Peters, MB. Akad. Berl.* 1867, p. 703.

Ears long, narrow, and pointed, as in *Pt. edulis*; interfemoral membrane very short behind, and concealed by the fur in the middle.

Fur intensely black, intermixed with a few greyish or yellowish hairs above and beneath; the back of the head and neck alone dark ferruginous brown. Some adult males have the neck almost bright yellow; young males like females.

The humerus and fleshy part of the forearm are covered with very short thinly spread fur; the fur occupies a space 3 inches wide across the middle of the back, and the thighs are covered above and beneath; the wing-membrane, as far as a line drawn from the elbow to the knee, is covered with long black fur, which also extends in a line behind the forearm to the carpus.

The last upper and lower molars smaller than in *Pt. edulis*; teeth otherwise similar to those of that species.

Length, head and body 9″, ear 1″·35, forearm 6″·6, thumb 2″·5, second finger 4″·6; third finger—metacarp. 4″·4, 1st ph. 3″·3, 2nd ph. 5″; fifth finger—metacarp. 4″·7, 1st ph. 2″·1, 2nd ph. 2″; tibia 3″·2, foot 2″·1.

Hab. Australia (Cape York, Bet Island, Quail Island, Howick's group, Gould Island, Percy Island).

This species resembles the dark-coloured varieties of *Pt. edulis*, but may be at once distinguished by its much smaller size, and especially by the narrowness of the interfemoral membrane in the middle, where its posterior margin is quite concealed by the fur, also by the the thighs being covered above and beneath.

Mr. Pierson Ramsay, who has lately had an opportunity of examining several well-preserved specimens of this species, remarks * that "the males, as in this sex in *Pt. conspicillatus*, have the hair on the nape stiff and unctuous; the females have not this peculiarity, and the nape-band, instead of being stiff, compressed, and of a greasy feeling, is soft and rather spreading; it varies from deep yellowish red to very deep blackish tan-red.

"This species was observed in countless numbers towards dusk flying from the mainland (Cape York) to islands in the straits, and in the early part of the morning, at break of day, they returned on their way to the scrubs. During the month of August many of

* Proc. Linn. Soc. N. S. Wales, 1877, pt. ii. p. 8.

the females shot had young of considerable size attached to the breasts."

a. ♀ imm. sk. (type).	Australia.	J. Gould, Esq. [C.].
b. ♀ ad. sk.	Australia.	
c, d. ♂ imm. & ad. sk.	Australia.	
e, f. ♂ imm. sks.	N. Australia (Quail Island).	Dr. Elsey [P.].
g–l. ♂ & ♀ juv., al.	N. Australia (Quail Island).	Dr. Elsey [P.].
m. ♀ ad. sk.	Howick's group.	Voy. 'Rattlesnake.'
n. ♂ imm. sk.	Gould Island.	Voy. 'Fly.'
o. ♂ ad. sk.	Percy Island.	Purchased.
p. skull.		

36. Pteropus conspicillatus.

Pteropus conspicillatus, *Gould, Gray, P. Z. S.* 1849, p. 109; *Gould, Mammals of Australia*, iii. pl. 29 (1853).

Ears as in *Pt. medius*, but shorter, obtusely pointed, and more abruptly narrowed above; interfemoral membrane very narrow, quite concealed by the fur in the centre.

Face and crown of the head black, with a ring of pale brownish-yellow fur round each eye, extending slightly forwards on the cheek; back of the head, nape, and shoulders pale yellowish; chin, throat, and neck black, with some yellow fur extending round from the back of the neck; breast and abdomen black, with a few shining yellowish hairs; back similar.

The fur is short, even on the neck above, and scarcely extends upon the forearms or legs; on the back, across the loins, slightly more than 2 inches wide.

Upper incisors strong; central lower incisors separated by a space, each half the size of the outer incisor; canine and second premolar separated by a moderately wide space in both jaws; first upper premolars deciduous; premolars and molars as in *Pt. medius*; last upper molar larger than the first lower premolar, which is slightly larger than the last molar.

Zygomatic arches much curved outwards; postorbital processes of the frontal very long, almost circumscribing the orbit, and nearly meeting the corresponding processes from the zygomatic arches.

Length (of the type specimen, an adult ♂), head and body about 10″–12″, ear 1″·25, eye from tip of nostril 1″·2, forearm 7″, thumb 2″·3, second finger 4″·6; third finger—metacarp. 4″·3, 1st ph. 3″·3, 2nd ph. 5″·2; fifth finger—metacarp. 4″·6, 1st ph. 2″·1, 2nd ph. 2″·2; tibia 3″·2, foot 2″·3.

Hab. Australia (Fitzroy Island; Rockingham Bay, Queensland); Yule Island, New Guinea.

This species resembles *Pt. gouldii*, but the light-coloured rings round the eyes at once distinguish it. Mr. Pierson Ramsay (who has lately had an opportunity of examining several specimens from Rockingham Bay brought to the Sydney Museum) remarks* that the "colouring of the orbits is more defined in some, paler in others;

* Proc. Linn. Soc. N. S. Wales, 1877, pt. ii. p. 7.

males with unctuous collar; largest adults 18½ inches long, forearm 7 inches."

Mr. Macgillivray, who first discovered this species, gives the following notes on its habits in his Journal:—"On the wooded slope of a hill on Fitzroy Island I one day fell in with this Bat in prodigious numbers, looking while flying in the bright sunshine (so unusual for a nocturnal animal) like a large flock of rooks. On close approach a strong musky odour became apparent, and a loud incessant chattering was heard. Many of the branches were bending under their load of Bats, some in a state of inactivity, suspended by their hind claws, others scrambling along among the boughs, and taking to wing when disturbed."

a. ♂ ad. sk.	Fitzroy Island, east coast of Australia.	Voy. of 'Rattlesnake.'
b. ♂ ad. sk.	Australia.	J. Gould, Esq. [C.].
	(Figured and described by Gould.)	
c. skull of *a*.		

37. Pteropus ocularis.

Pteropus ocularis, *Peters, MB. Akad. Berl.* 1867, p. 326.

Ears shorter than the muzzle, like those of *Pt. griseus*; wings about three quarters of an inch apart at their origin from the sides of the back; interfemoral membrane very narrow in the centre.

Muzzle light reddish brown; eyes surrounded by broad light reddish-brown rings, separated in the middle between the eyes by a narrow dark brown stripe; crown of the head, chin, throat, and abdomen dark brown, with some light yellowish hairs; nape and sides of the neck reddish yellow, paler yellow at the shoulder-level, separated by a well-defined line from the dark brown fur of the back.

Fur short and appressed upon the forearm, extending more densely upon the interfemoral membrane along the proximal half of the tibiæ; beneath, the wing-membrane between the humerus and the femur is covered with woolly fur, but both the anterior and posterior limbs are naked.

The teeth in the single specimen known are so much changed by age or disease that their original form cannot be described.

Length (of an old ♂), head and body about 10″, head about 2″·65, ear 0″·87 × 0″·5, eye from the extremity of the muzzle 1″, forearm 5″·35, thumb 2″·4; third finger—metacarp. 3″·6, 1st ph. 2″·7, 2nd ph. 4″; fourth finger—metacarp. 3″·6, 1st ph. 2″·2, 2nd ph. 2″·1; fifth finger—metacarp. 3″·75, 1st ph. 1″·6, 2nd ph. 1″·4; tibia 2″·3, calcaneum 0″·55, foot 2″·2.

Hab. Ceram.

This species is known only from a single specimen of an old male in the collection of the Berlin Museum. In the colour of the fur, and in the light-coloured rings around the eyes, it resembles *Pt. conspicillatus* from Australia; but it is very much smaller than that species, and the ears are conspicuously shorter.

38. Pteropus keraudrenii.

? Pteropus mariannus, *Desmarest, Mammal.* p. 547 (1822).
Pteropus keraudren, *Quoy et Gaimard, Voyage de l'Uranie*, i. p. 51, pl. 3 (1824).
Pteropus keraudrenius, *Temminck, Monogr. Mammal.* i. p. 186 (1827); *Wagner, Suppl. Schreb. Säugeth.* v. p. 600 (1857).
Pteropus tonganus *et* vanicorensis, *Quoy et Gaimard, Voyage de l'Astrolabe*, i. p. 74, pls. 8 & 9 (1833).
Pteropus insularis, *Hombron et Jacquinot, Voyage au Pôle Sud*, pl. 5; *Peters, MB. Akad. Berl.* 1869, p. 371.
Pteropus dussumierii, *Geoffroy, Dict. Class.* xv. p. 701.
Pteropus geddiei, *Macgillivray, Peters, l. c.* 1867, p. 326.
Pteropus keraudrenii, *Peters, l. c.* p. 331.
Pteropus flavicollis *et* geddiei *et* vitiensis, *Gray, Catal. Monkeys and Fruit-eating Bats*, pp. 107, 109 (1870).

Ears rather narrow, conical, and obtusely pointed, very similar in shape to those of *Pt. samoensis*, scarcely as long as the muzzle, half the concave surface of the conch thinly clothed with soft hairs.

Interfemoral membrane narrow in the centre, concealed by the fur; wings from the sides of the back.

Face in front of the ears shining yellowish brown intermixed with black hairs; crown of the head silvery grey; back of the head, neck, and shoulders bright yellowish buff in male, pale buff in female; back black, intermixed with a few shining grey hairs, the dark colour commencing abruptly, and contrasting strongly with the bright-coloured fur of the neck; beneath, the chin and throat are black, the neck bright reddish yellow intermixed with black, breast and abdomen black, the extremities of many hairs shining grey.

Fur moderately long and dense; on the upper surface the anterior extremities are nearly naked, but the thighs are covered; the fur of the back short, appressed, occupying a space across the loins about two inches wide; beneath, the wing-membrane is covered rather thickly by moderately long fur as far as a line drawn from the outer third of the humerus to the knee, terminating abruptly; the thighs are thickly covered, and some hairs extend upon the tibiæ.

The greater number of adult specimens of this species are distinguishable by the above characters, but in others, examples either of not full-grown or very old individuals, with fur characteristic of different seasons or of different localities, the colour, quality, and distribution of the fur are slightly different; and these differences have chiefly led to the large number of synonyms which are brought together in the above list.

In a young female specimen from Samoa the head, back, and under surface are very dark brown (appearing quite black in alcohol), the back of the head, neck, and shoulders pale reddish yellow; the interfemoral membrane is about a quarter of an inch deep in the centre, where it is clothed with long fur, which also extends laterally as far as a line drawn between the middle of the tibiæ; the tibiæ are almost

naked (as in the adult), a few hairs appearing on their proximal third only*.

First upper premolar (in immature specimens) in the rather narrow space between the canine and the second premolar, nearly as large as one of the middle lower incisors (in old individuals generally absent); last upper molar almost as large as the first lower premolar, which nearly fills the space between the canine and second premolar; last lower molar scarcely as large as one of the outer lower incisors; premolars and molars with well-developed internal cusps and posterior transverse basal ridges, becoming worn down and quite disappearing in old individuals; the third upper premolar with a slight indication of an antero-internal basal projection.

In a young specimen, still retaining some of the milk-teeth, the first upper premolar is well developed, and quite as large as one of the middle lower incisors.

Length (of an adult ♂), head and body 9″·5, head 2″·75, ear 1″, eye from nostril 1″, forearm 5″·7, thumb 2″·4, second finger 4″; third finger—metacarp. 3″·8, 1st ph. 2″·8, 2nd ph. 4″·2; fifth finger—metacarp. 3″·8, 1st ph. 1″·7, 2nd ph. 1″·7; tibia 2″·6, calcaneum 0″·8, foot 1″·7.

(For comparative measurements of skull, see p. 66.)

Hab. Polynesian Subregion (except the Sandwich Islands, Gilbert's group, Ellice's group, and the islands east of Samoa), apparently generally distributed, extending from the Mariana Islands to Savage Island, and from the New Hebrides to Samoa.

Adult specimens of *Pt. keraudrenii* may generally be easily distinguished from those of other species of the section to which it belongs by the peculiarly light colour of the fur of the neck, which contrasts strongly with the dark-coloured fur of the back, by the blunt conical ears, by the hairs extending slightly upon the legs, and by the form of the teeth. In the bright-coloured patch of fur on the crown of the head, and in the shape of the ears, it agrees closely with *Pt. jubatus*, but its very much smaller size at once distinguishes it. From *Pt. samoensis*, which is found in some of the islands inhabited by this species, it is distinguished by the comparatively longer ears and very different quality and distribution of the fur, which, in that species, clothes the legs to the ankles. This character not only at once distinguishes the adult animals, but also the young.

a. ad. sk.	Moala Island, Fiji.	J. Macgillivray, Esq. [C.].
b, c. ♀ imm. & ad. sks.	Moala Island, Fiji.	F. M. Rayner, Esq. [P.].
d, e. ♂ ad. sks.	Ovalau Island, Fiji.	F. M. Rayner, Esq. [P.].
	(Type of *Pteropus flavicollis*, Gray.)	
f. ♂ ad. sk.	Totoya Island, Fiji.	F. M. Rayner, Esq. [P.].
g, h. imm. & ad. sks.	Tariuni, Fiji.	E. A. Liardet, Esq. [P.].
i. ♂ ad., al.	Fiji Islands.	Godeffroy Museum.
j, k. ♂ & ♀ ad., al.	Samoa.	Godeffroy Museum.

* With this contrast description of young of *Pt. samoensis*, from same locality (see p. 35).

l. ♀ imm., al.	Samoa, Navigators' Is.	Rev. S. J. Whitmee [P.].
m. ♂ ad., al.	Samoa, Navigators' Is.	Rev. S. J. Whitmee [P.].
n. ♀ imm., al.	Samoa, Navigators' Is.	Purchased.
o. ♀ imm., al.	Savage Island.	Dr. A. Günther [P.].
p. ♂ ad., al.	Aneiteum, N. Hebrides. (Type of *Pteropus geddiei*, M'G.)	M'Gillivray [C.].
q. ad. sk.		Capt. Sir E. Belcher [C.].
r. imm. sk.		Capt. Denham.
s. im. sk.		
t. skull of *e.*		
u. skull of *r.*		
v. skull.	Fiji Islands.	Voy. of the 'Herald.'

Var. *α*.

Pteropus insularis, *Hombron et Jacquinot, Voy. au Pôle Sud*, pl. v.; *Peters, MB. Akad. Berl.* 1869, p. 391.

Quite similar to *Pt. keraudrenii* in the form of the ears, in the quality and distribution of the fur, in the form of the skull, and in dentition, but much smaller and slightly different in colour.

In a male and female from the Pelew Islands the fur of the neck in the male is bright yellow above, pale yellow on the sides, and divided in front by a band of dark hairs passing backwards from the throat to the breast; in the female the upper surface of the neck is pale buff, and the inferior surface black, the pale-coloured fur not extending beyond the sides of the neck.

Length (of an adult male), ear 0″·9, forearm 5″·2 thumb 2″·1, third finger 10″, fifth finger 6″·9, tibia 2″·3, foot 1″·7.

Hab. Caroline Islands.

a. ♂ ad. sk.	Yap, Pelew Islands.	Godeffroy Museum.
b. ♀ ad., al.	Pelew Islands.	Godeffroy Museum.
c. ♂ ad., al.	Pelew Islands.	Godeffroy Museum.
d, e. ♂ ad. & ♀ im. sks.	Pelew Islands.	Godeffroy Museum.
f. ♀ imm. sk.	Mackenzie Island.	Godeffroy Museum.

Var. *β*.

Pteropus loochooensis, *Gray, Catal. Monkeys and Fruit-eating Bats*, p. 106 (1870).

Ears shorter than in *Pt. keraudrenii*, but in shape similar to those in that species; the tibiæ are also comparatively much shorter, and the measurements of the skull different. Externally this variety resembles *Pt. keraudrenii* closely.

An old female has the fur of the face pale greyish yellow intermixed with some brown hairs, especially on the sides in front of the ears; neck and anterior part of the breast pale yellow; the remainder of the breast and abdomen brown, with many intermixed greyish-yellow hairs. Young males have fur like specimens of *Pt. keraudrenii* from Fiji and other islands.

When skulls of *Pt. keraudrenii* and of this variety of the same

length are compared together, the distance from the postorbital foramen to the extremity of the nasal bones in the former is found to be considerably less than in the latter, while the distance from the postorbital foramen to the supraoccipital crest is much greater; the zygomatic arches in *Pt. loochooensis* are also less curved outwards, and there is no ascending process; dentition nearly similar in both, but in this species the canine is separated by a greater interval from the second premolar, and the last upper molar is larger, being equal to, if not larger than, the first lower premolar; the last lower molar is smaller than the first premolar, but larger than one of the outer lower incisors.

The following are the comparative measurements of the skulls of *Pt. keraudrenii* and of this variety:—

	Pt. keraudrenii.	*Pt. loochooensis.*
Extreme length	2·45	2·45
From postorbital foramen to the anterior extremity of the nasal bones	0·95	1·05
From postorbital foramen to the occipital crest	1·55	1·4
From the anteorbital foramen to the extremity of the nasals	0·6	0·7
Length of the bony palate	1·1	1·15

Length (of an old ♀), head and body about 0″·9, ear 0″·85, forearm 5″·75, thumb 2″·25, second finger 4″·1; third finger—metacarp. 3″·6, 1st ph. 2″·75, 2nd ph. 4″; fifth finger—metacarp. 3″·75, 1st ph. 1″·7, 2nd ph. 1″·9; tibia 2″·3.

Hab. Loochoo Islands.

a, b. imm. ♂ & ad. ♀ sks. (type). Loochoo Islands. Purchased.
c. skull of *a*.

39. Pteropus macklotii.

Pteropus macklotii, *Temminck, Monogr. Mammal.* ii. p. 69, pl. 35. fig. 5 (head); ? *Cassin, United States Explor. Exped.* viii. (2nd ed. 1858) p. 10; *Peters, MB. Akad. Berl.* 1867, p. 333.
? Pteropus vociferus, *Peale, l. c.* (1st ed. 1848) p. 19; *Cassin, l. c.* p. 11.
Pteropus floresii, *Gray, Catal. Monkeys and Fruit-eating Bats,* p. 106 (1870).

Ears much longer than the muzzle, narrow, and obtusely pointed, naked; interfemoral membrane very short, and concealed in the centre by the fur.

Face brown, the hairs with bright yellow extremities; the brown colour more marked on the inferior surface of the muzzle and on the throat: crown of the head and neck bright yellow; across the shoulders brownish yellow, with shining extremities; on the back and arms bright ferruginous yellow; rump reddish yellow, with some shining or greyish hairs; chest and abdomen dark brown, most of the hairs with shining yellow extremities; pubis reddish yellow. In old individuals the colour of the fur is brighter throughout.

Hair covering the sides of the face peculiar, long, and directed backwards towards the ears; on the back and arms closely appressed; fur of the back occupying a space more than two inches wide across the loins; wings one inch apart at their origin from the sides of the back; legs nearly naked; beneath, the antebrachial membrane and the wings between the humerus and femur and along the forearm are covered with woolly hair.

Upper incisors of peculiar shape, long, narrow and acutely pointed, separated by slight intervals from each other; lower outer incisors about twice the diameter of the inner ones and much longer; inner incisors close together in front; all the lower incisors in young individuals bifid; no trace of first upper premolar; third upper premolar with an antero-internal basal process as in *Pt. jubatus*, last molar with an antero-external cusp, and larger than the first lower premolar, which stands in the centre of the space between the canine and second premolar; last lower molar about the size of the first premolar.

Length (of the type specimen), head and body about 9″, ear 1″·25, eye from tip of nostril 1″·05, forearm 5″·2, thumb 2″·4, third finger—metacarp. 3″·7, 1st ph. 2″·7, 2nd ph. 4″·1; fifth finger—metacarp. 3″·7, 1st ph. 1″·65, 2nd ph. 1″·6; tibia 2″·3, foot 1″·8.

(For measurements of skull, see p. 70.)

Hab. Flores, Timor, Batchian.

Type in the collection of the Leyden Museum.

This species is easily distinguished by the long ears (which, in proportion to the size of the animal, are probably longer than in any other species of the genus) and peculiarly long fur on the sides of the face. The dentition is also very characteristic, and the presence of a small antero-internal basal cusp in the third upper premolar connects it with *Pt. jubatus*.

a. ♂ ad. sk.	Batchian Island.	A. R. Wallace, Esq. [C.].
b. ♂ imm. sk.	Timor.	Purchased.
c. ♂ ad. sk.	Flores. (Type of *Pt. floresii*, Gray.)	A. R. Wallace, Esq. [C.].

Var. *a*.

Pteropus celebensis, *Schlegel, Peters, MB. Akad. Berl.* 1867, p. 333.

Smaller than *Pt. macklotii*, but generally similar to it in the colour and distribution of the fur, and in the long ears, which are, however, comparatively broader, and the antero-internal basal process of the third upper premolar is not so much developed; the incisors are similar in both species.

Fur of face and head rather long, yellowish buff; neck similar, but brighter yellow; shoulders bright buff; chin and throat brown, with some shining hairs; neck, chest, and abdomen bright yellowish buff; back dark yellowish brown; fur of humerus very short, appressed, none or very little on the forearms; legs naked; distribution of the fur on the membranes beneath similar to that of *Pt. macklotii*, but the hairs are shorter.

Length (of the type specimen), head and body about 8″, ear 1″·1,

eye from tip of nostril 0″·9, forearm 5″, thumb 2″·2; third finger—metacarp. 3″·4, 1st ph. 2″·4, 2nd ph. 3″·9; fifth finger—metacarp. 3″·5, 1st ph. 1″·45, 2nd ph. 1″·45; foot 1″·5.

(For measurements of skull, see p. 70.)

Hab. Celebes.

Type in the collection of the Leyden Museum.

40. Pteropus caniceps.

Pteropus caniceps, *Gray, Catal. Monkeys and Fruit-eating Bats*, p. 107 (1870).

Pteropus affinis, *Gray, l. c.* p. 108.

Ears longer than the muzzle, triangular above, and obtusely pointed, naked; muzzle moderately long; interfemoral membrane very short behind, concealed by the fur.

Head greyish brown, intermixed with dark brown or black hairs, the extremities of most of the hairs shining; neck and shoulders bright yellowish buff; back shining yellowish grey, intermixed with black or dark brown hairs; beneath, the neck is darker than above; breast and abdomen buff, the centre of the breast with a patch of greyish shining hairs.

Above, the anterior extremities are almost naked; the back is covered for a space of about 2 inches wide, and the thighs are thinly clothed, but the legs and feet are naked; distribution of the fur beneath as in *Pt. macklotii*.

The teeth on the whole resemble those of *Pt. macklotii*; but the upper incisors are broader and shorter; the third upper premolar has a slight indication of an antero-internal cusp.

Length (of the type specimen), head and body about 8″, head 2″·5, ear 1″, forearm 5″·3, thumb 2″·2, second finger 3″·9, third finger—metacarp. 3″·5, 1st ph. 2″·6, 2nd ph. 4″·1; fifth finger—metacarp. 3″·65, 1st ph. 1″·55, 2nd ph. 1″·5; tibia 2″·2, foot 1″·65.

Hab. Batchian Island.

Pt. caniceps, described by Dr. Gray from a single specimen, is probably a hybrid between *Pt. hypomelanus* and *Pt. macklotii*. It resembles the former in the general colour of the fur, but differs from it in the longer ears, very differently coloured fur of the back and of the sides of the breast and abdomen, and in the teeth; while it agrees with the latter species in the form of the ears and in the presence of a small antero-internal cusp in the third upper premolar.

a. ad. sk. (type).	Batchian Island.	A. R. Wallace, Esq. [C.].
b. imm. sk.	Jilolo Island.	A. R. Wallace, Esq. [C.].

(Type of *Pteropus affinis*, Gray.)

41. Pteropus jubatus.

Pteropus jubatus, *Eschscholtz, Zool. Atlas*, iv. p. i, pl. 16 (1831); *Temminck, Monogr. Mammal.* ii. p. 51 (1835–41); *Wagner, Suppl. Schreb. Säugeth.* v. p. 595; *Peters, MB. Akad. Berl.* 1867, p. 332; *Gray, Catal. Monkeys and Fruit-eating Bats*, p. 105 (1870); *Dobson, Monogr. Asiat. Chiropt.* p. 21 (1876).

Pteropus pyrrocephalus, *Meyen, Nov. Act. Soc. Cæs. Leop.-Car. Nat. Cur.* xvi. p. 604.

Acerodon jubatus, *Jourdan, F. Cuvier, Ann. des Sci. Nat.* viii. p. 376.

Ears shorter than in *Pt. medius*, triangular in upper third, extremities narrowly rounded off or subacute; upper third of the outer margin of the ear-conch flattened.

Interfemoral nearly 1 inch wide in the centre, not concealed by the fur; wings less than 1 inch apart at their origin from the sides of the back, but the fur, though very short, occupies a space nearly 3 inches wide in this position; legs naked, or with a few scattered hairs only.

Face dark brown or black; on the crown of the head varying from pale golden yellow to bright silvery greyish with a yellowish tinge passing into the reddish yellow of the neck; in adult males the red collar extends round the under surface of the neck, in females it ends on the sides of the neck, or there is a slight tinge only of red in the dark fur of the throat and neck beneath; back dark reddish brown, the extremities of the hairs slightly grizzled, especially posteriorly; breast and abdomen deep reddish brown, intermixed with greyish hairs.

Upper incisors conical; the central incisors close together, and separated from the outer incisors on each side by a small space; first upper premolar closer to the canine than to the second premolar in the young, deciduous in adults; third upper premolar and first molar with prominent antero-internal basa lcusps (Plate IV. fig. 6); last upper molar about one third the size of the antepenultimate molar; outer lower incisors more than double the size of the inner incisors, which are bifid; first lower premolar about the size of the last molar, in the centre of the space between the canine and second premolar.

Length, head and body 10″, head 3″·3, ear 1″·25, eye to tip of nostril 1″·2, forearm 7″·2, thumb 3″·2, third finger 14″·5, fifth finger 9″·2, tibia 3″·3, foot 2″·1, calcaneum 1″, interfemoral membrane in the centre 0″·7.

Hab. Philippine Islands.

This species probably occupies the next place to *Pt. edulis* in point of size. From *Pt. edulis*, and from other species externally similar, it is at once distinguished by its very peculiar teeth, which are better developed than in any other species of the genus; the third upper premolar and the first molar have distinct antero-internal cusps, the presence of which led M. Jourdan to constitute it the type of a genus *Acerodon*. Antero-internal cusps also occur in the corresponding teeth of *Pt. keraudrenii*, *Pt. macklotii*, and *Pt. molossinus* (see description of teeth of these species); but none of these species approach *Pt. jubatus* in size, and in none is this antero-internal cusp so much developed.

The following are the measurements of a skull of an adult male of this species in the collection, and also those of skulls of the types of *Pt. macklotii*, Temminck, and *Pt. celebensis*, Peters, in the collection of the Leyden Museum:—

	Pt. jubatus.	*Pt. mack-lotii.*	*Pt. cele-bensis.*
Extreme length from occipital crest to end of nasal bones	3·2	2·6	...
Breadth across zygomatic arches	1·8	1·45	1·3
Length from supraorbital foramen to extremity of nasals	1·55	1·25	1·1
From infraorbital foramen to extremity of nasals	1·05	0·85	0·7
Space occupied by last four upper molars	0·95	0·6	0·55
Space occupied by last four lower molars	1·1	0·75	0·65

a, *b*. ♂ imm., al.	Luzon.	Dr. A. B. Meyer [C.].
c, *d*. ♀ ad., al.	Luzon.	Dr. A. B. Meyer [C.].
e. ♀ ad., al.	Dinagut Island.	Mr. Everett [C.].
f–*h*. ♂, ♀, and sk. in al.	Mindanao.	Purchased.
i. ♂ ad. sk.	Mindanao.	Dr. Steere [C.].
j. ♀ ad. sk.	Philippine Islands.	Mr. Cuming [C.].
k. ♀ ad. sk.		Haslar Coll.
l. skull of *e*.		
m. skull of *h*.		

3. CYNONYCTERIS.

? Eleutherura *, *Gray, Voy. Sulphur, Mammalia*, p. 29 (1844).
Cynonycteris, *Peters, Reise nach Mossambique, Säugeth.* p. 25 (1852); *id. MB. Akad. Berl.* 1867, p. 865; *Dobson, Journ. Asiat. Soc. Beng.* 1873, p. 202; *id. Monogr. Asiat. Chiropt.* p. 29 (1876).
Xantharpyia *et* Eleutherura, *Gray, P. Z. S.* 1866, p. 64; *Catal. Monkeys and Fruit-eating Bats*, pp. 115, 116 (1870).

Muzzle long and conical; nostrils projecting by their inner margins; upper lip with a wide groove in front, with sloping, not elevated, margins †; index finger with a distinct claw; metacarpal bone of the middle finger as long as or longer than the index finger; wings from the sides of the hairy back and from the base of the second toe; tail short, distinct, partially included in the narrow interfemoral membrane.

Dentition. Inc. $\frac{4}{4}$, ♀. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{2-2}{3-3}$.

Skull and teeth very similar to those of *Pteropus*, but the sagittal crest is less developed, the postorbital processes are much shorter, and the cranio-facial axis is nearly horizontal; the first upper premolar and the last upper and lower molars are comparatively much larger.

The very close affinity of this genus with *Cynopterus* is shown in the occurrence of a transitional form, *Cynonycteris grandidieri*, Peters, from Africa, which has the external form of *Cynopterus*,

* I reject this name in favour of *Cynonycteris*, subsequently proposed by Dr. Peters, because, although *Pteropus hottentotus* (= *Cynonycteris collaris*, Illig.) is named by Dr. Gray as the type of his genus, nevertheless the short definition of *Eleutherura* is altogether incorrect, and may have been founded on a specimen of a species very different from *C. collaris*, and belonging to a different genus.

† Except in *C. grandidieri*.

short muzzle and similar upper lip, and the dentition of *Cynonycteris*; but the last molar in the upper and last two molars in the lower jaw are quite rudimentary, and scarcely perceptible without removing the gum. It is therefore very questionable whether *Cynonycteris* can be considered more than a subgenus of *Cynopterus*.

Range. From Africa and Madagascar, through Southern Asia Minor (Palestine, coasts of the Persian Gulf), India, Ceylon, Burma, Siam, Malay Peninsula, and the islands of the Malay Archipelago as far eastwards as New Ireland.

Unlike the arboreal habits of the species of the closely allied genus *Pteropus*, some of the species of this genus are occasionally found inhabiting caves; a colony of *C. amplexicaudata* was discovered by Mr. W. T. Blanford in the Nimakdun salt-caves in Kishm Island, and *C. ægyptiaca* was found in a cave in the Wady Kern, Central Palestine, by Canon Tristram, and, according to Geoffroy and Temminck, inhabits the chambers of the Great Pyramid and other deserted buildings in Egypt. It is probable, however, that these species inhabit caves and trees indifferently as they find them convenient; and I believe that individuals that have lived in caves may be distinguished at once by their short fur from those habitually dwelling in trees.

Synopsis of the Species.

I. Upper lip with a wide groove in front, with sloping, not elevated margins; molars well developed.
  A. Wings from the sides of the back.
    a. Neck (in ♂) with some long coarse hairs beneath scarcely forming a collar.
      b. First upper premolar persistent; ears longer than the muzzle.
        b'. The first upper premolar in the centre of the space between the canine and second premolar; muzzle long.
          b''. Thumb longer than the tibia .. 4. *C. ægyptiaca*, p. 74.
          c''. Thumb shorter than the tibia.
            c'''. Legs nearly naked; forearm 3″·35 ..... 1. *C. amplexicaudata*, [p. 72.
            d'''. Legs hairy; forearm 3″·8.... 5. *C. collaris*, p. 75.
        c'. The first upper premolar closely wedged in between the canine and second premolar; muzzle short.
          d''. Thumb shorter than the tibia.
            e'''. Legs naked; forearm 2″·8.... 2. *C. minor*, p. 73.
      c. First upper premolar deciduous; ear not exceeding the muzzle in length.. 3. *C. brachyotis*, p. 74.
    b. Neck (in ♂) with a broad collar in front, terminating by an abrupt well-defined margin.
      e''. Thumb equal to the tibia in length; forearm 2″·3 ..... 6. *C. torquata*, p. 76.
  B. Wings from the back near the spine.
    a. Muzzle long and narrow, fur occupying a narrow space across the loins.

a'. Fur bright yellowish on the sides of the back and on the extremities.. 7. *C. straminea*, p. 77.
b'. Fur pale greyish brown ..... 8. *C. dupreana*, p. 78.

II. Upper lip with a narrow groove in front, with elevated rounded margins, as in *Pteropus* and *Cynopterus*.
a. Muzzle short; molars small, scarcely raised above the level of the gum .. 9. *C. grandidieri*, p. 79.

1. Cynonycteris amplexicaudata.

Pteropus amplexicaudatus, *Geoffroy, Ann. du Mus.* xv. p. 96 (1810); *Temminck, Monogr. Mammal.* i. p. 200 (1827).
Pteropus leschenaultii, *Desmar. Mammal.* p. 110 (1821); *Blyth, Catal. Mammal. Mus. Asiat. Soc. Beng.* p. 21 (1863).
Pteropus pyrivorus, *Hodgson, Journ. Asiat. Soc. Beng.* 1835, p. 700.
Pteropus seminudus, *Kelaart, Journ. Asiat. Soc. Beng.* 1852, p. 345.
Cynonycteris amplexicaudata, *Peters, MB. Akad. Berl.* 1867, p. 865; *Dobson, Proc. Asiat. Soc. Beng.* 1872, p. 154; *Journ. Asiat. Soc. Beng.* 1873, p. 202, pl. xiv. fig. 8 (ear); *Monogr. Asiat. Chiropt.* p. 29 (1876).
Eleutherura marginata, infumata, philippinensis, *Gray, Catal. Monkeys and Fruit-eating Bats*, pp. 118, 119 (1870).
Cynonycteris infuscata, *Peters, l. c.* 1873, p. 487.

Head long, triangular; upper lip with a wide groove directly continuous with the emargination between the nostrils, the edges of the grooves smooth, not thickened as in *Pteropus* and *Cynopterus*; ears moderate, triangular, rounded at the tip, the upper half of the outer margin straight, the lower half convex.

Posteriorly the ears are naked, except at their bases, anteriorly the conch is clothed with a few very short fine hairs. The fur of the body extends upon the humerus and upon the fleshy part of the forearm, the remaining part to the carpus has only a few very fine hairs. The portion of the back and wing-membrane covered with fur across the loins is not more than an inch in breadth. The interfemoral membrane is densely covered with hair at the root of the tail, and on either side as far as lines drawn from the knee-joints to the base of the free portion of the tail; the remaining portion, the legs, and a considerable part of the wing-membrane beyond are clothed with short thinly spread fur, which extends along the wing-membrane and legs to the back of the feet. Beneath, the antehumeral membrane is clothed with rather long, thinly spread fur, and the wing-membrane is similarly covered as far as a line drawn from the knee to a point about half an inch posterior to the elbow, whence the fur extends outwards posterior to the forearm to the carpus. The interfemoral membrane, the legs, and the feet are covered with a few very short hairs. Fur short, varying in colour from dark olive or smoky brown to reddish or yellowish brown. First upper premolars minute, equally distant from the canine and second premolar; second premolar exceeding lower canine in vertical extent; first lower premolar small, less than half the size of the second premolar; second premolar nearly equal to lower canine in vertical extent.

(For measurements, see p. 79.)

Hab. From the Persian Gulf to the Philippine Islands; Bengal, Southern India, Ceylon, Burma, Celebes, Amboyna, Timor, Aru Islands.

The habits of this species are thus noticed by Mr. B. H. Hodgson:—"The *Pteropi* never appear in the central hilly region of Nipal save in the autumn, when they come in large bodies to plunder the ripe fruit in the gardens. The lesser species is a perfect pest from the havoc it makes among the ripe pears. Hence I have called it *pyrivorus*. These animals are never seen in Central Nipal save at midnight, at which time they come to feed, and necessarily from a very considerable distance. In the plains it is noted of them that they will travel 30 or 40 miles, and as many back, in the course of a single night, in order to procure food."

a. ♀ ad. sk.	India.	Captain Boys [C.].
	(*Eleutherura marginata*, Gray.)	
b, c. ♂ ad., al.	Nipal.	B. H. Hodgson, Esq. [P.].
	(Type of *Pteropus pyrivorus*, Hodgson.)	
d. ♂ sk.	Himalayas.	
	(Type of *Cynopterus affinis*, Gray.)	
e–j. sks.		Leyden Museum.
k. ad. sk.	Ceylon.	Dr. Kelaart [P.].
	(Type of *Pteropus seminudus*, Kelaart.)	
l. ♂ ad., al.	Ceylon.	Purchased.
m. ad. sk.	Lao Mountains.	Mr. Mouhot [C.].
n. ♀ ad. sk.	Sumatra.	Mr. Turner [C.].
o. ♂ ad. sk.	Philippine Islands.	
	(Type of *Eleutherura philippinensis*, Gray.)	
p. ♀ ad., al.	Philippine Islands.	Zoolog. Soc. Coll.
q. ♂ ad. sk.	Flores.	A. R. Wallace, Esq. [C.].
	(Type of *Eleutherura infumata*, Gray.)	
r. ♀ imm. sk.	Timor.	Purchased.
s. ♀ ad., al.		M. Lidth de Jeude.
t. skull.	Nipal.	B. H. Hodgson, Esq. [P.].
u. skull of *a*.		

2. Cynonycteris minor.

Cynonycteris minor, *Dobson, Journ. Asiat. Soc. Beng.* 1873, p. 203, pl. xiv. fig. 9; *Monogr. Asiat. Chiropt.* p. 32, fig. (ear).

Ears smaller and proportionally narrower than in *C. amplexicaudata*, muzzle shorter.

The minute first upper premolar is closely wedged in between the canine and second premolar; in *C. amplexicaudata* it is separated by a narrow interval from both these teeth.

The distribution of the fur is somewhat similar to that of the preceding species, but the hair is much shorter on the wing-membrane, and almost absent from the backs of the tibiæ, from the adjoining portions of wing-membrane, and from the feet.

Length, head and body 3″·7, tail 0″·45, head 1″·55, ear 0″·68 × 0″·35, ear to tip of nostril 1″·3, eye to tip of nostril 0″·45, forearm

2″·8, thumb 0″·9, third finger 4″·4, fifth finger 3″·3, tibia 1″·05, foot 0″·75.

Hab. Java.

Type in the collection of the Indian Museum, Calcutta.

3. Cynonycteris brachyotis.

Cynonycteris brachyotis, *Dobson, P. Z. S.* 1877, p. 116.

Resembles *C. minor*, Dobson, in size and in the nakedness of the extremities, but may be at once distinguished by the much shorter ears, longer muzzle, and deciduous first upper premolars.

Ears short, oval, rounded off above; a prominent thickened lobule at the base of the outer margin of the ear-conch; muzzle long and narrow, as in *C. amplexicaudata* (Plate V. fig. 3); males with shoulder-glands concealed by tufts of thickened yellow hairs, as in *Pteropus*.

Fur short, dark brown above, with greyish tips; beneath light greyish brown. On the upper surface, the back of the neck, posteriorly, and the shoulders are very thinly covered, almost naked, and the fur of the body scarcely extends upon the membranes; the tibiæ and feet and adjacent interfemoral membrane are naked; beneath, a broad band of fur extends outwards behind the elbow and forearm, lessening in width towards the carpus.

First upper premolar very small in immature individuals, deciduous in adults; remaining teeth as in *C. amplexicaudata*.

In the following Table the relative measurements of this species and of *C. minor* are given:—

	Length, head.	eye from nose.	ear.	forearm.	thumb.	2nd finger.	4th finger.	tibia.	foot and claws.
		"	"	"	"	"	"	"	"
C. brachyotis	1·5	0·55	0·55	2·85	0·9	4·5	3·4	1·15	0·7
C. minor	1·55	0·45	0·68	2·8	0·9	4·4	3·3	1·05	0·75

Hab. New Ireland.

a. imm. sk.	New Ireland.	Rev. G. Brown [C.].
b, c. ad. sks. (type).	New Ireland.	Rev. G. Brown [C.].

4. Cynonycteris ægyptiaca.

Pteropus ægyptiacus, *Geoffroy, Descript. de l'Egypte*, ii. pp. 135, 136, pl. iii. fig. 3 (1812).

Pteropus geoffroyi, *Temminck, Monogr. Mammal.* i. p. 197, pl. xv. figs. 14, 15 (1827).

Cynonycteris ægyptiaca, *Peters, MB. Akad. Berl.* 1867, p. 865.
Eleutherura ægyptiaca, *Gray, Catal. Monkeys and Fruit-eating Bats*, p. 117 (1870).

Very like *C. amplexicaudata*, but the muzzle is comparatively thicker and less pointed in front, the thumb longer, and the tibiæ shorter; the interfemoral membrane also is more thickly covered, and a distinct band of fur extends on the wing-membrane along the outer side of the tibia.

On the upper surface the greater part of the interfemoral membrane is clothed with soft fur, which descends upon the tibiæ and upon the adjoining wing-membrane to the backs of the feet; the antebrachial membrane is nearly naked, and the fleshy part of the forearm is clothed with short hairs only; beneath, the antebrachial is covered with soft fur, and a broad band of very short fine fur extends outwards behind the forearm to the carpus.

In the following columns are given the measurements of skulls of *C. ægyptiaca* and *C. amplexicaudata* respectively:—

From supraoccipital crest to end of nasals	1·75	1·6
Breadth across zygomatic arches	1·15	0·92
From postorbital foramen to end of nasals	0·85	0·72
Length of bony palate	0·9	0·75

(For general measurements see Table, p. 79.)

Hab. Egypt, Abyssinia, Palestine.

a, b. ♀ ad. sks.	Egypt.	J. Burton, Esq. [P].
c, d. ♂ & ♀ ad. sks.	Egypt.	Dr. Turnbull Christie [P.].
e. ad. sk.	Abyssinia.	Captain Harris [C.].
f, g. ♂ ad., al.	Wady Kern, Central Palestine.	Canon Tristram [C.].
h, i. skulls.	Egypt.	Dr. Turnbull Christie [P.].

5. Cynonycteris collaris.

Pteropus collaris, *Illiger, Abhandl. Akad. Berl.* 1815, p. 84; *Lichtenstein, Verz. Doubl. Berl.* 1823, p. 3.
Pteropus leachii, *Smith, Zoolog. Journal*, iv. p. 433 (1829); *Illustr. S. Afr. Zoology, Mammal.* pl. 48; *Temminck, Monogr. Mammal.* ii. p. 88.
Pteropus hottentottus, *Temminck, l. c.* p. 87; *Victorin, Zoolog. Capland, in Vetensk. Akad. Handl. Stockholm*, 1858.
? Eleutherura hottenttota, *Gray, Voy. Sulphur, Mammal.* p. 29 (1844).
Cynonycteris collaris, *Peters, Reise nach Mossambique, Säugeth.* p. 25 (1852); *MB. Akad. Berl.* 1867, p. 865.
Eleutherura unicolor *et* collaris, *Gray, Catal. Monkeys and Fruit-eating Bats*, pp. 117, 118 (1870).

Corresponds closely in general form with the preceding species; but the crown of the head appears to be more depressed, the thumb is shorter, the distribution of the fur slightly different, and the measurements greater throughout.

Fur dark brown or yellowish brown above and beneath. Sides of the lower jaw and inferior surface of the muzzle clothed with straight,

rather coarse hairs, which are much longer (in adult males) on the sides and inferior surface of the neck and of a deep yellow colour. About half the forearm is clothed with rather short hair; the wing-membranes are naked, except along the sides of the body; the interfemoral is covered as far as the notch in the centre behind, the remainder and the tibiæ with a few short hairs; feet covered with short hairs. Beneath, the antebrachial is thinly covered; the wing-membrane is clothed as far as a line drawn from the elbow to the knee, and a deep band of fur passes outwards behind the elbow and the forearm to the carpus, decreasing in width outwards; a small patch of very short fur appears upon the metacarpal of the thumb.

Palate-ridges as in *C. ægyptiaca*, except that the third posterior divided ridge, represented by two oval papillæ, is absent.

(For measurements see Table, p. 79.)

Hab. Equatorial and Southern Africa (West Africa, Gaboon; East Africa, Natal; South Africa, Cape of Good Hope.)

a. ♀ ad. sk.	Gaboon. (Type of *Eleutherura unicolor*, Gray.)	Purchased.
b. ♂ ad., al.	Natal.	Purchased.
c. ♀ ad. sk.	Port Natal.	
d–f. ♂ imm. & ad., al.	Cape Town.	Trustees of S. Afr. Museum [P.].
g. ♂ ad. sk.	Cape of Good Hope.	Purchased.
h. ♀ ad., al.	South Africa.	Sir A. Smith [C.].
i. imm. ♂ sk.	South Africa.	Stockholm Museum.
j. skull of *c*.		
k. skull.	South Africa.	G. H. Ford, Esq. [P.].

6. Cynonycteris torquata.

Cynopterus collaris, *Gray* (non *Geoffroy*), *Catal. Monkeys and Fruit-eating Bats*, p. 123 (1870).

Slightly more than half the size of *C. collaris*. The head also is comparatively broader and shorter, and the crown of the skull more elevated above the face-line.

The male has the under surface of the neck clothed with remarkably long, densely set yellow hairs, which extend outward upon the shoulders and backwards upon the breast, terminating abruptly, forming a broad well-defined ruff, very distinct from the short fur of the body (Plate V. fig. 2).

Above, half the forearm is covered with short hairs, and the wing-membrane as far as a line drawn from the middle of the humerus to the knee; nearly the whole of the interfemoral is thickly covered, but the lower third of the tibiæ and the legs are quite naked. Beneath, a few fine hairs appear upon the antebrachial membrane and upon the wing-membrane between the humerus and the femur and behind the elbow, but no band of fur passes outwards behind the forearm to the carpus.

Above, reddish brown, head paler; beneath, pale brown except the ruff, which is bright reddish yellow.

Upper incisors arranged in an angular series between the canines; last lower premolar placed on the commencement of the ascending ramus of the jaw, so that, although much smaller, its crown is higher than that of the antepenultimate molar.

In the following columns are given the measurements of an adult male (a dried specimen) and of a younger male (the type, preserved in alcohol):—

Length, head and body	...	3·5
„ tail	...	0·35
„ head.....	...	1·3
Distance of the eye from the nostril	...	0·45
Length, ear.....	0·6	0·6
„ forearm	2·3	2·15
„ thumb	0·85	0·85
„ second finger	1·7	1·5
„ third finger, metacarpal.....	1·55	1·35
„ „ 1st phalanx	1·05	1·0
„ „ 2nd „	1·55	1·4
„ fifth finger, metacarpal	1·5	1·35
„ „ 1st phalanx	0·7	0·65
„ „ 2nd „	0·85	0·7
„ tibia	0·85	0·8
„ foot	0·5	0·5

Hab. Africa (Angola).

a. (type) ♂, al. (not full-grown).	Angola.	Dr. J. E. Gray.
b. ad. ♂ sk.	Africa.	Sir J. Richardson.

7. Cynonycteris straminea.

Pteropus stramineus, *Geoffroy, Ann. du Muséum*, xv. p. 95 (1810); *Temminck, Monogr. Mammal.* i. p. 195 (1827), ii. p. 84 (1835–41).
Xantharpyia straminea, *Gray, List of Mammal. Brit. Mus.* p. 38 (1843); *Catal. Monkeys and Fruit-eating Bats*, p. 116 (1870).
Pachysoma straminea, *Tomes, P. Z. S.* 1860, p. 44.
Pterocyon paleaceus, *Peters, MB. Akad. Berl.* 1860, p. 423.
? Pteropus mollipilosus, *Allen, Proc. Acad. Nat. Sci. Philad.* 1861, p. 159.
Pterocyon stramineus, *Peters, Jornal de Scien. Math. Phys. e Natur. Lisboa*, no. x. 1870.
Cynonycteris straminea, *Peters, MB. Akad. Berl.* 1867, p. 866.

Considerably larger than *C. collaris*, with a longer and narrower head, and with fur quite different in quality, colour, and distribution from that of any other species of the genus. The wings also arise from the sides of the back closer to the spine.

The fur of the head and neck is, as in *Pteropus*, different in length and in colour from that of the back. Above, the face in front of the eyes and the ears are nearly naked; the head and neck are covered with rather short erect fur, which, however, is longer than that of the back, which is closely appressed, and occupies a space scarcely one and a half inch wide across the loins; the humerus and three fourths of the forearm are clothed with short appressed fur,

and the interfemoral membrane and the legs to the ankles are covered with longer hair; on the ventral surface the fur is very short, the antebrachial membrane is covered with short straight hairs, and similar fur clothes the wing-membrane between the humerus and femur, and extends outwards behind the elbow and forearm to the carpus, becoming narrower as it passes outwards.

Head and nape of neck greyish yellow; fur of the back brownish or greyish yellow along the middle, bright straw-yellow on the sides; anterior and posterior extremities also bright straw-yellow above. This peculiar bright yellow colour is different from that of any other Bat, and at once distinguishes the species.

Skull and teeth similar in general characters to those of *C. collaris*, but the skull is proportionally longer, and the brain-case less vaulted. Upper incisors small, unicuspidate, separated from each other; lower incisors equal, close together, canine and second premolars in both jaws separated by a wide space, in the anterior half of which the first premolar is placed.

(For measurements see Table, p. 79.)

Hab. Africa (West Africa, Sierra Leone, Gambia, Gaboon; East Africa, White Nile, Senegal, Senaar, Abyssinia, Zanzibar).

a. ♂ old, al.	Sierra Leone.	P. L. Strachan, Esq. [P.].
b. ♂ ad. sk.	Gambia.	
c. ♂ ad., al.	Elloby District, Gaboon.	H. Ansell, Esq. [P.].
d. ♂ imm., al.	Gaboon.	Purchased.
e, f. ♂ imm. & ♀ ad., al.	West Africa.	A. Murray, Esq. [P.].
g. ♂ ad., al.	Zanzibar.	Dr. Kirk [C.].
h. ad. sk.	Africa.	
i. ♀ ad. sk.		
j, k. imm. & ad. sks.	Senegal.	Purchased.
l. ♀ imm. sk.	Whydah.	Mr. Fraser [C.].
m. ♀ ad. sk.	Senaar.	Mr. Parreys [C.].
n. ♀ ad. sk.		— Shillinglaw, Esq. [P.].
o. ad. sk.		
p. ad. sk.		
q. skull.	Senaar.	Mr. Parreys [C.].
r. skull of *m*.		

8. Cynonycteris dupreana.

Pteropus dupreanus, *Pollen, Schlegel, P. Z. S.* 1866, p. 419.
Cynonycteris dupreana, *Peters, MB. Akad. Berl.* 1867, p. 866.

Apparently similar to *C. straminea* in structure, but larger, and differing in the colour of the fur, which closely resembles that of the lighter-coloured specimens of *C. collaris*.

Above, pale yellowish or greyish brown, paler on the neck; beneath similar, but paler and dull buff-brown on the sides. The fur also is thinner on the legs and feet.

(For measurements see p. 79.)

Hab. Madagascar (Nossi-Bé).

a. ♀ ad. sk.	Madagascar.	Purchased.

	C. amplexicaudata.	*C. egyptiaca.*	*C. collaris.*	*C. straminea.*	*C. dupreana.*
Length, head and body	5·0	4·8	5·5	6·5	7·5
„ tail	0·7	0·6	0·8	0·5	0·7
„ head	1·65	1·6	1·8	2·35	2·4
„ eye from nostril	0·6	0·6	0·75	0·95	1·0
„ ear	0·75	0·8	0·85	1·1	1·2
„ forearm	3·35	3·2	3·8	4·8	...
„ thumb	1·0	1·35	1·2	1·5	1·7
„ third finger, metacarpal	2·1	2·0	2·3	2·9	3·3
„ „ 1st phalanx	1·4	1·4	1·6	2·1	2·4
„ „ 2nd „	1·85	1·8	2·5	3·25	3·4
„ fifth finger, metacarpal	1·9	1·9	2·25	2·8	3·2
„ „ 1st phalanx	1·0	1·0	1·2	1·3	1·5
„ „ 2nd „	1·0	0·95	1·1	1·4	1·45
„ tibia	1·5	1·25	1·55	1·9	2·0
„ foot	0·85	0·98	1·0	1·2	1·4

9. Cynonycteris grandidieri.

Cynonycteris grandidieri, *Peters, MB. Akad. Berl.* 1869, p. 394.

Head short and broad; nostrils and upper lip as in *Cynopterus marginatus*; ears longer than the muzzle, lower half of the inner margin of the ear-conch thickened, upper half convex, upper fourth of the outer margin flattened beneath the tip, a small acute projection near the termination of the outer margin below.

Wings from the outer toe as in *Cynopterus*; tail very short, scarcely exceeding the interfemoral membrane.

The last two molars in both jaws quite rudimentary, especially in the lower jaw, where they can scarcely be seen without cutting down upon them, the other teeth as *C. amplexicaudata*.

Fur of the back rather long and dense, much longer than that of the under surface; legs clothed with a few fine hairs. Above brownish yellow, paler beneath.

The pectoral teats (in the single male specimen) are so large that at first sight the specimen from which this description is taken appears to be a female. I have found a similar development of the mammæ in a male specimen of *Cynopterus marginatus* from Ceylon, referred to under the description of that species. It is probable that where two young are born at a single birth, the male relieves the female of the charge of one (as the weight of two might render flight difficult or impossible), and at the same time performs the office of a nurse. It is well known that many species of Bats have occasionally two young at a birth, but I have never found a mother with more than one clinging to her body. The size of the pectoral teats in many male specimens (though in none yet observed by me so large as in this species and in the other case referred to above) lead me to think that instances of the male performing the office of nurse are probably not uncommon among Bats.

Length (of the type specimen, an adult ♂), head and body 3″·3, tail 0″·35, head 1″·2, eye from end of nose 0″·4, ear 0″·7, forearm 2″·5, thumb 0″·8; third finger—metacarp. 1″·5, 1st ph. 1″, 2nd ph.

1″·55; fourth finger—metacarp. 1″·4, 1st ph. 0″·8, 2nd ph. 0″·85; fifth finger—metacarp. 1″·5, 1st ph. 0″·7, 2nd ph. 0″·75; tibia 0″·85, foot 0″·6.

Hab. Zanzibar.

Type in the collection of the Paris Museum.

In external form this Bat is a *Cynopterus*. In fact no zoologist could during life say that it belonged to the genus *Cynonycteris*. Remembering the presence of an additional upper molar in a specimen of *Pteropus medius* from Nipal (*vide* p. 51), I would at once consider the additional teeth of no importance, and place this species in the genus *Cynopterus*. But the antepenultimate molars are also small, so that it seems that they are the rudimentary condition of previously well-developed teeth. Is this form, then, an example of a species of *Cynonycteris* passing into *Cynopterus*, or can it be a hybrid?

4. CYNOPTERUS.

Cynopterus, *F. Cuvier, Dents des Mammif.* p. 39 (1825); *Peters, MB. Akad. Berl.* 1867, p. 866; *Gray, Catal. Monkeys and Fruit-eating Bats*, 1870, p. 121; *Dobson, Journ. Asiat. Soc. Bengal*, 1873, p. 200; *Monogr. Asiat. Chiropt.* 1876, p. 23.

Pachysoma, *Is. Geoffroy, Dict. Class. Hist. Nat.* p. 705 (1828).

Muzzle much shorter than in *Cynonycteris*, and comparatively thicker; nostrils projecting, deeply emarginate between; upper lip with a narrow vertical groove in front bounded laterally by naked prominences as in *Pteropus*; index finger with a distinct claw; metacarpal bone of the middle finger longer than the index finger; wings from the sides of the hairy back and from the first toe; tail short, distinct (except in *Megœrops*).

Dentition. Inc. $\frac{4}{4}$ or $\frac{4}{2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{1-1}{2-2}$.

General form of the teeth as in *Cynonycteris*, but less in number than in that genus, the last upper and last two lower molars being absent *.

Range. The Oriental Region; one species only found slightly beyond the limits of this region, in Morty Island (Jilolo).

This genus appears to be most closely allied to *Pteropus*, even more so than *Cynonycteris*, which agrees with that genus in the dental formula. The form of the nostrils and of the narrow groove on the upper lip, bounded by naked, raised, prominent margins, are quite similar to the same parts in *Pteropus*; while in *Cynonycteris* the groove on the upper lip is deep and wide, with slanting sides. The absence of a tail in one of the species *C.* (*Megœrops*) *ecaudatus*, gives further indication of its natural affinities.

* The rudimentary condition of these teeth in the transitional form *Cynonycteris grandidieri* shows that this is the correct view of the homologies of the teeth in *Cynopterus*.

Synopsis of the Subgenera and Species.

a. Tail distinct.
- *a'*. Incisors $\frac{4}{4}$ ..... Subgenus CYNOPTERUS.
  - *a''*. Molars narrow, much longer than broad; upper incisors nearly equal.
    - *a'''*. Base of the outer margin of the ear-conch straight or faintly convex.
      - *a*⁴. Ears nearly double the length of the muzzle, margined very distinctly with white ..... 1. *C. marginatus*, p. 81.
      - *b*⁴. Ears not much longer than the muzzle, no white margin.
        - *a*⁵. Fur of the head scarcely differing in colour from that covering the back; ears narrow; forearm 2″·7. 2. *C. scherzeri*, p. 84.
        - *b*⁵. Fur of the head black, contrasting with the much lighter-coloured fur of the body; ears oval; forearm 1″·7 ..... 3. *C. melanocephalus*, p. 85.
    - *b'''*. Base of the outer margin of the ear-conch forming a distinct rounded projection.
      - *c*⁴. Ears not much longer than the muzzle, no white margin; forearm 2″·2.... 4. *C. brachysoma*, p. 85.
  - *b''*. Molars very broad; upper incisors nearly equal.
    - *d*⁴. Ears not much longer than the muzzle.
      - *c*⁵. Fur of the head dark brown, of the body reddish brown; forearm 2″·8. 5. *C. latidens*, p. 86.
- *b'*. Incisors $\frac{4}{2}$ ..... Subgenus PTENOCHIRUS.
  - *c''*. Molars as in *C. marginatus*; inner upper incisors much longer than the outer ones; forearm 3″·1 ..... 6. *C. jagorii*, p. 87.

b. Tail none.
- *c*. Incisors $\frac{4}{2}$ ..... Subgenus MEGÆROPS.
  - *e*⁴. Ears as in *C. melanocephalus*; forearm 2″·1 ..... 7. *C. ecaudatus*, p. 87.

Tail distinct: incisors $\frac{4}{4}$. Subgenus CYNOPTERUS.

1. Cynopterus marginatus.

Pteropus marginatus, *Geoff. Ann. du Mus.* xiv. p. 97; *Temm. Monogr. Mammal.* i. p. 202, pl. xiv.

Cynopterus marginatus, *F. Cuvier, Dents des Mammif.* p. 39 (1825); *Kelaart, Prodr. Faunæ Zeylanicæ*, p. 28 (1852); *Blyth, ibid.* p. 37; *Peters, MB. Akad. Berl.* 1867, p. 866; *Jerdon, Mamm. of India*, p. 20 (1867); *Gray, Cat. Monkeys and Fruit-eating Bats*, p. 122 (1870); *Dobson, J. A. S. B.* 1873, p. 200, pl. xiv. fig. 4 (ear); *Monogr. Asiat. Chiropt.* p. 24.

Pteropus tittheæcheilus, *Temm. l. c.* i. p. 198.

Pachysoma diardii *et* duvaucellii, *Is. Geoffr. Dict. Class. Hist. Nat.* xiv. p. 705; *Temminck, l. c.* ii. pp. 95, 96.

Pachysoma brevicaudatum, *Is. Geoff. l. c.*; *Temminck, l. c.* p. 92.

Pteropus pyrivorus, *Hodgson*, *P. Z. S.* 1836, p. 36.
Cynopterus horsfieldii, *Gray*, *Cat. Mamm. Brit. Mus.* p. 38 (1843); *Horsfield*, *Cat. Mamm. Mus. E. I. Comp.* p. 30 (1851).
Pachysoma luzoniense, *Peters*, *MB. Akad. Berl.* 1861, p. 708.
Eleutherura marginata, *Gray*, *P. Z. S.* 1866, p. 64.

Ears large, rounded at the tip, with a slight but distinct concavity of the outer margin immediately beneath the tip; both the outer and inner margins of the ear-conch are bordered with white; the white border along the inner margin is one twelfth of an inch wide, and contrasts strongly with the dark brown colour of the ear; the outer margin terminates below without forming a lobe at the base. Nostrils projecting, with a deep emargination intervening. The upper lip marked in the centre, as in *Pteropus*, with a narrow vertical groove, bounded laterally by naked prominences continuous with the integument of the nostrils.

Ears naked posteriorly, except at their bases; anteriorly a few hairs appear upon the conch along the outer side of the white border of the inner margin, and, similarly, along the inner side of the white border of the outer margin. On the upper surface the fur extends upon the wing-membrane nearly as far as a line joining the elbow- and knee-joints, also thinly upon the humerus, the femur, and proximal end of the tibia; beneath, the antebrachial membrane is covered with moderately long, thinly spread hairs, and the wing-membrane is clothed to about the same extent as upon the upper surface, the hairs also passing outwards in a narrow band posterior to the forearm. The colour of the fur is extremely variable—dark brown, reddish brown, snuff-brown, or olive-brown, sometimes with a bluish tinge throughout. The fur of the male is distinguished from that of the female, especially during the rutting-season, by a collar of stiff radiating reddish-yellow hairs, the coarseness and colour of which appear to depend upon the presence of glands on the sides and on the inferior surface of the neck, similar to those on the shoulders of most species of *Pteropus*.

Upper incisors close together, short, equal in length, placed in a straight line in the space between the canines, from which a slight interval separates them on each side; lower incisors somewhat smaller, forming a slightly arched row, the outer incisors on each side separated as above by a small space from the canine *. First upper premolar minute, in the centre of the space between the canine and second premolar, and slightly to the outer side of the tooth-row; second premolar nearly equal to the lower canine in vertical extent.

Length (of an adult ♂ recently killed), head and body 4″·4, tail 0″·4, head 1″·5, ear 1″ × 0″·5, ear from tip of nostril 1″·2, eye from tip of nostril 0″·5, forearm 3″, third finger 5″, fifth finger 3″·7, thumb 1″·1, tibia 1″·1, foot 0″·7.

* In old individuals the lower inner incisors are occasionally found wanting, and their place partially occupied by the outer incisors (see Monogr. Asiat. Chiropt. p. 25).

Hab. India generally, from the Himalaya to Cape Comorin; Ceylon, Andaman Islands, Arracan, Burma, Malay Peninsula, Siam, Sumatra, Java, Billiton Island, Borneo, Philippine Islands.

This Bat is very common in India, and extremely destructive to fruit of all kinds, especially to guavas, plantains, and mangoes. To a specimen of this Bat, obtained by me at Calcutta, uninjured, I gave a ripe banana, which, with the skin removed, weighed exactly two ounces. The animal immediately, as if famished with hunger, fell upon the fruit, seizing it between the thumbs and the index fingers, and took large mouthfuls out of it, opening the mouth to the fullest extent with extreme voracity. In the space of three hours the whole fruit was consumed. Next morning the Bat was killed, and found to weigh one ounce, half the weight of the food eaten in three hours! Indeed the animal when eating seemed to be a kind of living mill, the food passing from it almost as fast as devoured, and apparently unaltered, eating being performed alone for the sake of the pleasure of eating. This will give some idea of the amount of destruction these Bats are capable of producing among ripe fruits. "In Nipal this Bat is a perfect pest, from the havoc it makes among the ripe pears and guavas. Mr. Hodgson says they are only seen in Nipal about midnight, when they come to feed from very considerable distances. In the plains it is noted of them that they will travel from thirty to forty miles, and as many back, in the course of a single night, in order to procure food" *.

One of the specimens in the collection, an adult male, from Ceylon, has well-developed mammæ, the teats being as large as in any female during lactation. I have observed an abnormally large size of the mammæ in some male specimens of other species of Bats also, and think it probable that where two are born at the same birth, the male may relieve the female of the charge of one of the young ones, and act to it as a nurse. This supposition is strengthened by the consideration that the weight of two young ones would seriously affect the flight of the female (*vide antea*, p. 79).

a–e. ♂ & ♀ imm. et ad.	India.	Secretary of State for India [P.].
f. ad. sk.	India.	Leyden Museum.
g. ♂ ad., al.	Madras.	T. C. Jerdon, Esq. [P.].
	(*Eleutherura ellioti*, Gray.)	
h. ♂ ad., al.	Madras.	T. E. J. Boileau, Esq. [P.].
i, j. ad. sk.	Madras.	Sir Walter Elliot [P.].
	(*Eleutherura ellioti*, Gray, ? type.)	
k. ♀ ad., al.	Ceylon.	Purchased.
l. ♀ ad., al.	Ceylon.	Purchased.
	(With fœtus *in utero*.)	
m. ♂ ad., al.	Ceylon.	Purchased.
	(With well-developed mammæ.)	
n, o. ad. sks. (one in al.).	Pinang.	
p. ♀ ad. sk.	Pinang.	

* Hutton, P. Z. S. 1872, p. 693.

q. ♀ ad. sk.	Malacca.	
r–*v*. ad. sks.	Malacca.	
w. ad. sk.	Sumatra.	
(Labelled "Type of *Pachysoma brevicaudatum*, Geoff.")		
x–*a'*. ♂ & ♀ ad. sks.	Java.	E. India House Coll.
b'. ♀ imm., al.	Philippine Islands.	Zool. Soc. Coll.
c'. ♂ ad., al.	Philippine Islands.	Zool. Soc. Coll.
d', *e'*. ♀ juv. et ad., al.	Philippine Islands.	
f'–*h'*. ♀ ad. sks.		
i'. ad. sk.		
j'. ad. sk.		
k'–*n'*. ♂ & ♀ ad., al.		Sir A. Smith.
o'. ♂ ad., al.		Lieut. Strickland.
p'. ♂ imm., al.		
q'. ad. sk.		St.George Mivart,Esq.[P.].
r', *s'*. ad. sks.		
t'. ad. skeleton.	Sumatra.	Purchased.
u'. ad. skeleton.	Java.	Purchased.
v'. imm. skeleton.	? Java.	Purchased.
w'. imm. skeleton.	India.	East India House Coll.
x'. skeleton.	Ceylon.	Purchased.
y'. skeleton.		

2. Cynopterus scherzeri.

Pachysoma scherzeri, *Fitzinger, Sitzungs. Wien. Akad.* 1860, p. 389 (*nom. nudum*).

Cynopterus marginatus, var. Pachysoma scherzeri, *Zelebor, Reise der öster. Freg. 'Novara,' Säugeth.* p. 11 (1868).

Cynopterus scherzeri, *Dobson, Monogr. Asiat. Chiropt.* p. 26, fig. (ear).

This species, like *Pt. nicobaricus*, was named but not described by Fitzinger; and Zelebor regards it as a variety of *C. marginatus*. It is at once distinguished from that species by its small and narrow ears, which are also not margined with white. When adult specimens of *C. marginatus* and of this species are compared together, the difference in the size and shape of the ears is very striking.

The muzzle is thicker in front and the colour of the fur much darker than in any specimen of *C. marginatus*.

Length (of an adult ♀ preserved in alcohol), head and body 3″·7, tail 0″·55, head 1″·3, ear 0″·63 × 0″·32, eye to tip of nostril 0″·45, forearm 2″·7, thumb 1″, third finger 4″·75, fifth finger 3″·5, tibia 1″, foot 0″·6.

Hab. Car-Nicobar Island; found beneath the leaves of the cocoanut palms.

Zelebor mentions that the ears of the specimens obtained at Car-Nicobar are margined with white; but I have been unable to detect even the slightest trace of a white border in the ears of several specimens from the same locality examined by me. Therefore either Zelebor has been mistaken, or the white bordering of the ears is not a constant character in this species, or I have wrongly identified the species here described with *C. scherzeri*. But, although it is quite impossible to identify the species here described with that obtained during the 'Novara' Expedition at Car-Nicobar Island from

Zelebor's description (which consists merely of some unimportant remarks on the colours of the fur, wing-membranes, and eyes), yet, as the animals which furnished the above description were taken not only at the same island, Car-Nicobar, but also from the same place on that island, namely from the leaves of the cocoa-nut palms, I think it highly probable that they belong to the same species, and accordingly, to avoid the possibility of introducing a fresh synonym, I have retained Fitzinger's name.

a. ♀ ad., al. Car-Nicobar Island. G. E. Dobson, M.B. [E.].
(With *fœtus in utero*.)

3. Cynopterus melanocephalus.

Pteropus melanocephalus, *Temm. Monogr. Mamm.* i. p. 190, pl. xii.
Cynopterus melanocephalus, *Peters, MB. Akad. Berl.* 1867, p. 867; *Dobson, Monogr. Asiat. Chiropt.* p. 27 (1876).

Ears small, oval; nostrils projecting considerably, deeply emarginate between. Fur above extending to the wing-membranes as far as a line drawn between the elbow and the knee; beneath almost confined to the body. Head black; shoulders and back pale reddish buff at the base of the hairs, the extremities light reddish brown; beneath pale buff throughout. The colour of the hair on the upper surface appears in the type specimen considerably faded.

Teeth as in *C. marginatus*; last lower molar very small, much smaller than upper one.

Length (of the type specimen), head and body 2″·8, ear 0″·4, eye from tip of nostril 0″·25, forearm 1″·7, thumb 0″·6, third finger 3″, fifth finger 2″·2, tibia 0″·6, foot 0″·5.

Hab. Java.

The type in the Leyden Museum is the only specimen of this the smallest species of *Cynopterus* yet obtained.

4. Cynopterus brachysoma.

Cynopterus brachysoma, *Dobson, J. A. S. B.* 1871, p. 260; 1873, p. 202, pl. xiv. fig. 7; *Monogr. Asiat. Chiropt.* p. 27, fig. (ear).

Ears slightly longer than the muzzle, broadly rounded off above, the upper third of the outer margin straight or even slightly convex; the presence of a rounded lobe at the base of the outer margin at once distinguishes this species.

Body very short and thick. Fur slaty blue, with a greyish or silvery tinge, the tip of the hairs sooty brown. The fur of the back is continuous with that of the abdomen through the notch in the interfemoral membrane, and completely conceals the short and slender tail. Above, the fur of the back extends upon the wing-membrane as far as a line drawn between the elbow- and knee-joints, covering it with long hair, also upon the humerus, half the length of the forearm, the femur, and proximal end of the tibia.

Length (of an adult ♀ preserved in alcohol), head and body 2″·9, tail 0″·25, head 1″·25, eye to tip of nostril 0″·4, ear 0″·6 × 0″·35,

forearm 2″·2, third finger 4″, fifth finger 3″, thumb 0″·9, tibia 0″·8, foot 0″·5.

Hab. Southern Andaman Islands.

Type in the collection of the Indian Museum, Calcutta.

5. Cynopterus latidens.

Ears small, oval, rounded off above, naked, not margined with white; muzzle rather short and obtuse.

Tail very short, quite concealed by the long fur surrounding it.

Fur of the head in front of and above the eyes very dark brown, almost black; crown of the head behind the eyes dark brown; back and neck reddish brown, the greater part of the hairs to the base greyish; beneath, greyish brown throughout.

The fur of the body is moderately long and very dense, extending outwards upon the humerus, which it covers altogether, and passes round the elbow to the fleshy part of the forearm; also upon the wing-membrane as far as a line drawn from the elbow to the knee, and upon the legs and adjoining membranes as far as the metatarsus, the hairs being rather long and moderately dense; interfemoral membrane very short in the centre, and thickly covered above and beneath with close fur, which conceals its posterior margin and the very short tail.

The teeth differ remarkably from those of every other known species of *Cynopterus* in their large size and great width (Plate V. fig. 1). The transverse and longitudinal diameters of each molar tooth are nearly equal; the first upper true molar has a very large external cusp; the last lower molar is very small, with a circular crown, equal to the first lower premolar in cross section, but scarcely one third the diameter of the antepenultimate molar; the lower canines are close together, their projecting cingulums being separated posteriorly by a narrow space. Some of the lower incisors are evidently deciduous, for in the specimen (the only example of this species as yet obtained) from which this description is taken three incisors occupy the whole space between the canines.

Length, ear 0″·6, forearm 2″·8, thumb 1″; third finger—metacarp. 2″, 1st ph. 1″·5, 2nd ph. 1″·9; fifth finger—metacarp. 1″·9, 1st ph. 0″·9, 2nd ph. 0″·9; foot 0″·65.

Hab. Morty Island, Malay Archipelago.

This species is at once distinguished by the very peculiar form of the molar teeth, which are not only different from those of every known species of *Cynopterus*, but also from those of every species of the suborder. Molar teeth of a somewhat similar form occur only in certain species of the group *Stenodermata* (of the widely separated family Phyllostomidæ), which are also frugivorous in their habits.

a. ♀ ad. sk. (type). Morty Island. A. R. Wallace, Esq. [C.].

Tail distinct: incisors $\frac{4}{2}$; upper middle incisors longer than the outer ones.
Subgenus PTENOCHIRUS.

Ptenochirus, *Peters, MB. Akad. Berl.* 1861, p. 707.

6. Cynopterus jagorii.

Pachysoma (Ptenochirus) jagorii, *Peters, MB. Akad. Berl.* 1861, p. 707; *id. l. c.* 1871, p. 867.
Cynopterus jagorii, *Dobson, Monogr. Asiat. Chiropt.* p. 28 (1876).

Ears like those of *C. marginatus*, but shorter and not margined with white; the outer margin also is less concave in upper third.

The fur of the body extends slightly upon the wing-membrane; but the under surface of the forearm is nearly naked. Fur above dark brown; beneath, a paler shade of the same colour.

Outer upper incisors less than half the size of the inner ones; lower incisors two, not much crowded, bifid; first upper premolar very small, in the narrow space between the canine and the large second premolar, but on the outer side (not outside) of the tooth-row; first lower premolar not so small, and in the centre of the tooth-row.

In all other respects, in the form of the head, muzzle, and body, &c., similar to *C. marginatus*.

Length, head and body 4″, tail 0″·5, ear 0″·7 × 0″·4, forearm 3″·1, thumb 1″·2, third finger 5″·2, fifth finger 3″·8, tibia 1″·2, foot 0″·75.

Hab. Philippine Islands (Luzon).

Type in the collection of the Berlin Museum.

Tail none; incisors $\frac{4}{2}$. Subgenus MEGÆROPS.

Megæra, *Temm. Monogr. Mamm.* ii. p. 359.
Megærops, *Peters, MB. Akad. Berl.* 1867, p. 867.

7. Cynopterus ecaudatus.

Pachysoma ecaudatum, *Temm. l. c.* ii. p. 94.
Megæra ecaudata, *Temm. l. c.* p. 359; *Wagner, Suppl. Schreb. Säugeth.* v. p. 611.
Megærops ecaudatus, *Peters, l. c.* p. 868.
Cynopterus ecaudatus, *Dobson, Monogr. Asiat. Chiropt.* p. 29 (1876).

Head and muzzle as in *C. marginatus*; apertures of nostrils rather wide, opening sublaterally; ears small, oval, very similar in relative size and shape to those of *C. melanocephalus*.

Fur yellowish brown throughout, extending broadly upon the wing-membrane across the loins as far outwards as a line drawn from the elbow- to the knee-joint; beneath, the fur is almost confined to the body.

Length (of the type specimen), head and body about 3″·8, ear 0″·5, eye from tip of nostril 0″·4, forearm 2″·1, thumb 0″·8, third finger 3″·8, fifth finger 2″·8, tibia 0″·75, foot 0″·5.

Hab. Sumatra.

The only specimen of this species yet obtained is preserved in the Leyden Museum.

5. HARPYIA.

Harpyia, *Illiger, Prodr. Syst. Mammal.* p. 118 (1811); *Temminck, Monogr. Mammal.* ii. p. 98 (1835–41); *Gray, P. Z. S.* 1866, p. 64; *Catal. Monkeys and Fruit-eating Bats*, 1870, p. 20; *Peters, MB. Akad. Berl.* 1867, p. 868.
Cephalotes, *Geoffroy* (in part), *Ann. du Muséum*, xv. p. 107 (1810).
Uronycteris, *Gray, P. Z. S.* 1862, p. 262.

Muzzle short, obtuse, and very thick; nostrils tubular, projecting abruptly for a considerable distance from the upper extremity of the muzzle; index finger with a large claw; wings from the sides of the body and from the base of the second toe; tail short, half contained in the interfemoral membrane.

Dentition. Inc. $\frac{2}{0}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{2-2}$.

Premaxillary bones well developed, united in front; facial bones much elevated above the margin of the jaw; lower canines close together.

This genus is at once distinguished by the peculiar tubular nostrils and by the dentition, which resembles that of no other genus. Although thus separated from all other genera of Pteropodidæ, it is evidently most closely related to *Cynopterus*, in which the nostrils of some species and especially of some individuals are much elongated, and the outer incisors in both jaws are sometimes very small or deciduous.

Range. Austro-Malayan subregion.

1. Harpyia cephalotes.

Vespertilio cephalotes, *Pallas, Spicileg. Zoolog.* iii. p. 10, figs. 1, 2 (1767).
Cephalotes pallasii, *Geoffroy, Ann. du Muséum*, xv. p. 107 (1810).
Harpyia pallasii, *Temminck, Monogr. Mammal.* ii. p. 101, pl. xl. figs. 1–5 (1835–41); *Gray, Mag. Zool. & Bot.* ii. p. 504 (1838).
Harpyia cephalotes, *Wagner, Suppl. Schreb. Säugeth.* i. p. 370 (1844); *Peters, MB. Akad. Berl.* 1867, p. 868.
Cynopterus (Uronycteris) albiventer, *Gray, P. Z. S.* 1862, p. 262.

Muzzle short, thick, and obtuse, the eye placed midway between the ear and the extremity of the muzzle; nostrils in the form of cylindrical tubes projecting abruptly from the extremity of the muzzle high above the margin of the upper lip, with slightly dilated notched apertures; upper lip very deep, divided by a narrow groove which is continuous with the emargination between the bases of the nasal tubes. Eyes large, placed high up on the sides of the face. Ears oval, longer than the muzzle, the outer and inner margins of the ear-conch convex, the summit rounded off, no lobule at the base of the outer margin.

Base of the first phalanx of the thumb contained within the wing-membrane; index finger with a large claw. Wing-membrane from the sides of the body and from the base of the second toe; interfemoral membrane much deeper and tail longer than in *Cynopterus*.

Integument of the body and wings dark brown, with several circular unequal white spots on the forearms and fingers, and a few on the wing-membrane.

Fur, above, reddish brown with an ashy tinge; beneath, dull yellowish white; a darker-coloured, almost black, streak, generally very narrow, but in some specimens increasing considerably in width posteriorly, extends from between the shoulders to the base of the interfemoral membrane.

Skull rather short; premaxillary bones well developed and united in front, the extremities of the nasal bones much elevated above the margin of the jaw; frontal bones slightly grooved mesially in front, elevated laterally, considerably raised above the nasals in front; postorbital processes short, their bases not perforated by a foramen as in *Cynopterus*.

Upper incisors well developed, filling up the space between the canines; each tooth is broadly conical, with a small external cusp; canines thick but not acute, with a second obtuse projection on the outer side near the extremity; first upper premolar minute, with a flattened crown, scarcely as high as the cingulum of the canine, in the narrow space between the canine and the second premolar, which is equal to about one half the canine; first molar with an oblique crown, slightly smaller than the second premolar, and equal to the second molar in cross section; lower canines close together in front; first lower premolar very small, with a flattened crown, having a small external cusp; second premolar three fourths the size of the canine, and much larger than the third, which equals the first molar in cross section; last lower molar scarcely more than half the size of the antepenultimate molar, with a flat, oblong, rectangular crown.

(For measurements, see p. 90.)

Hab. Celebes, Timor; Amboina; Gilolo; Morty Island; Cape York, N. Australia.

The original description of this species by Pallas leaves little to be desired. It contains also an excellent account of the visceral anatomy, illustrated by several figures.

a. imm. sk., in al.	Morty Island.	A. R. Wallace, Esq. [C.].
b. ♂ ad. sk.	Amboina.	Purchased.
c. ad. sk.	Cape York, N. Australia.	Purchased.
d. skull of *b*.		

2. Harpyia major.

Harpyia major, *Dobson, P. Z. S.* 1877, p. 187, figs. 1-3.

Much larger than *H. cephalotes*, Pallas, but with shorter ears, longer nasal tubes, and much paler-coloured fur, differing also in the form of the skull and of some of the teeth.

Fur, above, pale buff, the base of the hairs on the back dark; extremities of the hairs on the head and about the ears yellow; on the back the greater part pale buff; a dark vertebral line, as in *H. cepha-*

lotes, extends from a point between the shoulders to the tail; beneath, dull yellowish buff throughout.

Upper canine on each side with a prominent external cusp; last lower molar with a circular crown. In *H. cephalotes* the upper canine has a blunt, ill-defined external projection, and the crown of the last lower molar is oval or quadrilateral.

The skull in this species is also very much larger and differently shaped. The frontal bone is deeply grooved between the postorbital processes, and the nasal bones terminate at such a height above the premaxilla as to be on the same level with the floor of the groove behind them. The zygomatic arch is more than twice as thick as in *H. cephalotes*, and the postorbital processes of the frontal are longer.

Hab. New Guinea (south of Huon Gulf); Duke of York Island, New Ireland; New Georgia, Solomon Islands.

a. imm. sk.	New Guinea, south of Huon Gulf.	Dr. Comrie [C.].
b. ad. sk. (type).	Duke of York Island.	Rev. G. Brown [C.].
c. imm. sk.	Duke of York Island.	Rev. G. Brown [C.].
d. ? ad. sk.	New Georgia.	
e. skull of *b*.		
f. skull of *d*.		

The following Table exhibits the measurements of the type of this species, of another immature specimen with the epiphyses of the finger-bones unconsolidated, and of a perfectly adult specimen of *H. cephalotes* from Timor:—

	H. major (ad.).	*H. major* (imm.).	*H. cephalotes* (ad.).
Length, head and body, about	4·5	4·2	3·5
„ tail	0·9	0·9	0·7
„ head	1·55	1·5	1·3
„ ear	0·55	0·55	0·6
„ forearm	3·1	2·95	2·4 *
„ thumb	1·3	1·3	0·9
„ second finger	2·2	2·0	1·6
„ third finger, metacarp.	2·15	1·9	1·6
„ „ „ 1st ph.	1·65	1·55	1·25
„ „ „ 2nd ph.	2·3	2·1	1·7
„ fifth „ metacarp.	2·0	1·85	1·6
„ „ „ 1st ph.	1·0	0·95	0·75
„ „ „ 2nd ph.	1·2	1·05	0·85
„ tibia	1·2	1·1	0·85
„ calcaneum	0·45	0·4	0·3
„ foot	0·7	0·7	0·5

* I find that this is the constant length of the forearm of all perfectly adult specimens of *H. cephalotes* from the Malay Archipelago.

6. CEPHALOTES.

Cephalotes, *Geoffroy, Ann. du Muséum*, xv. p. 99 (1810); *Temminck, Monogr. Mammal.* ii. p. 103 (1835–41); *Gray, P. Z. S.* 1866, p. 64; *Peters, MB. Akad. Berl.* 1867, p. 871; *Gray, Catal. Monkeys and Fruit-eating Bats*, 1870, p. 119.

Hypoderma, *Is. Geoffr. Dict. Class. d'Hist. Nat.* v. p. 15; *Wagner, Suppl. Schreb. Säugeth.* i. p. 372 (1844).

Xantharpyia, *Gray, Voy. Sulphur, Mammalia*, p. 30 (1844) (*vide Peters, l. c.*).

Muzzle obtusely conical, as short as in *Cynopterus*; nostrils simple, rather wide apart, opening sublaterally, with a wide shallow emargination between; ears simple, separate; index finger without a claw; wings from the spine; wing-membrane attached to the base of the second toe; tail short, as in *Cynonycteris*.

Dentition. Inc. $\frac{2}{2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{2-2}{3-3}$.

This genus, represented by a single species only, appears to be most nearly allied to *Pteropus*, which it resembles in the form of the skull and of the molar teeth. It is, however, widely separated from all the genera of this group by the ununited condition of the premaxillary bones, and by the absence of a claw on the index finger.

Range. Austro-Malayan subregion.

1. Cephalotes peronii.

Pteropus palliatus, *Geoffroy, Ann. du Muséum*, xv. p. 99 (1810).

Cephalotes peronii, *Geoffroy, l. c.* p. 104, pl. vii.; *Temminck, Monogr. Mammal.* ii. p. 106, pl. xxxv. fig. 7, pl. xxxvi. figs. 24–29 (1835–41); *Peters, MB. Akad. Berl.* 1867, p. 871; *Gray, Catal. Monkeys and Fruit-eating Bats*, 1870, p. 119.

Hypoderma peronii, *Is. Geoffroy, Dict. Class. d'Hist. Nat.* xiv. p. 708 (1828).

Hypoderma moluccensis, *Quoy et Gaimard, Voy. de l'Astrolabe*, i. p. 86, pl. xi.

Xantharpyia amplexicaudata, *Gray, Voy. Sulphur, Mammalia*, p. 30 (1844).

Muzzle short, obtusely conical; the eye is nearer to the extremity of the nose than to the ear; ears narrow, subacutely pointed, longer than the muzzle; outer margin of the ear-conch concave immediately beneath the tip, then convex; inner margin convex in the middle, straight in upper third; nostrils as in *Pteropus* but not so prominent, separated by a wider space and opening more laterally; beneath, the centre of the upper lip is occupied by a naked raised and flattened cushion not divided by a vertical groove.

Index finger as long as the metacarpal bone of the middle finger, the terminal phalanx ending in a small curved process resembling a blunt nail.

Wing-membrane from the base of the second toe, and from the central line of the back, with which it is connected by a longitudinal very thin process of the integument. The wings are quite naked above, but the back covered by them is well clothed with hair.

Fur everywhere short; dark brown on the head, paler brown on the neck and shoulders; beneath, dull yellowish or greyish brown.

Above, the fur covering the shoulders terminates abruptly at about the posterior angle of the scapula, corresponding to the commencement of the wing-membrane; a few hairs appear upon the base of the interfemoral membrane, but the remainder of the membranes and the anterior and posterior extremities are naked; beneath, a band of rather long fur extends outwards behind the forearm towards the carpus.

General form of the skull similar to that of *Pteropus*, but the muzzle is much shorter, and the postorbital processes of the frontal scarcely more developed than in *Cynonycteris*; premaxillary bones slender, not united in the centre, each supporting a single incisor with a broad cutting-edge; lower incisors two, slender, in the narrow space between the canines; first upper premolar about two thirds the size of the canine, separated from it by a narrow interval; first upper molar once and a half the second premolar in cross section; second molar small, but exceeding the last lower molar in cross section; lower premolars and molars very similar to those in *Pt. jubatus*, with prominent antero-internal basal cusps, but the first lower premolar fills up the space between the canine and second premolar.

Length (of an adult ♀), head and body 6″·5, tail 1″·3, head 2″, ear 1″, eye from nose 0″·7, forearm 5″·3, thumb 1″·5, third finger—metacarp. 3″·1, 1st ph. 2″·35, 2nd ph. 3″·4; fourth finger—metacarp. 2″·8, 1st ph. 2″·15, 2nd ph. 2″·3; fifth finger—metacarp. 2″·8, 1st ph. 1″·7, 2nd ph. 1″·8; tibia 2″·3, foot 1″·2.

Hab. Austro-Malayan Subregion (Celebes, Timor, Amboina; Bouru; Ceram, Samar, Banda, Batchian, Ternate; Duke of York Island, New Ireland; San Cristoval Island, Solomon Islands).

a, *b*. ♀ ad. sk.	Celebes.	
c. ♂ ad. sk.	Timor.	Purchased.
d. ad. sk.	Amboina.	Capt. Sir E. Belcher [C.].
e. ♀ ad., al.	Amboina.	Capt. Sir E. Belcher [C.].
f. ♀ imm., al.	Amboina.	Capt. Sir E. Belcher [C.].
g. ♂ ad. sk.	Bouru.	
h, *i*. ♂ ♀ ad. sk.	Ceram.	A. R. Wallace, Esq. [C.].
j. ♀ juv. sk.	Ternate.	A. R. Wallace, Esq. [C.].
k. ♀ imm. sk.	Duke of York Island.	Rev. G. Brown [C.].
l. ♂ juv., al.	Duke of York Island.	Rev. G. Brown [C.].
m. ♀ imm. sk.	San Cristoval Island.	F. M. Rayner, Esq. [P.].
n. skull of *c*.		
o. skull of a very large individual.		Purchased.

7. NOTOPTERIS.

Notopteris, *Gray*, *P. Z. S.* 1859, p. 36; *Peters*, *MB. Akad. Berl.* 1867, p. 872.

Muzzle narrow, cylindrical, and pointed; nostrils not prominent, opening sublaterally, the extremity of the nose scarcely emarginate

between; ears simple, separate; index finger without a claw; wings from the central line of the back precisely as in *Cephalotes*, and from the metacarpal bone of the second toe; tail long, far exceeding the short interfemoral membrane.

Dentition. Inc. $\frac{2-2}{1-1}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{2-2}{2-2}$.

Tongue very long and attenuated.

This genus, represented by a single species only, is distinguished from all the known genera of this family by the remarkable length of the tail, and the very peculiar dentition described further on.

1. Notopteris macdonaldii.

Notopteris macdonaldii, *Gray*, *P. Z. S.* 1859, p. 38, pl. lxvii.

Head long, abruptly narrowed in front of the eyes, forming a very narrow, cylindrical, pointed muzzle; nasal apertures semilunate, opening sublaterally; the margins of the nostrils not prominent, almost level with the surrounding surface of the muzzle, the end of the muzzle marked by a very slight groove in front between the nostrils; ears as long as the muzzle, oval, very similar to those of *Cephalotes peronii* in shape, but comparatively broader, with a prominent thickened lobule at the base of the outer margin of the ear-conch, separated posteriorly by an angular notch; eyes large, much nearer to the ears than to the extremity of the muzzle; "iris dark hazel" (Dr. Macdonald).

Thumb rather short, the first phalanx free from the antebrachial membrane; index finger equal to the metacarpal bone of the middle finger in length, without a claw; tail nearly as long as the forearm, the base only connected with the short interfemoral membrane; calcanea short, very feeble; wings from the base of the metacarpal bone of the second toe, and from the centre line of the back, precisely as in *Cephalotes peronii*; the back apparently naked, as in that species, from the inferior angle of the scapula backwards, but really well covered with hair and concealed by the naked wing-membrane.

Muzzle nearly naked, the sides with a few long, erect, straight hairs; wing-membranes naked above or with a few scattered hairs only.

Fur, above, pale reddish brown, with a few greyish or shining hairs; beneath, paler.

Skull narrow, smooth, without ridges or crests; postorbital processes of the frontal very short; zygomatic arches slender; premaxillary bones slender, not united in front, each with a small outer incisor, and a rudimentary inner incisor not appearing above the alveolus, so that in recent specimens there appears to be but a single upper incisor on each side; a single minute lower incisor on each side close to the canine; upper canines large, longitudinally grooved in front.

Premolars very different in form from those in any other species of *Pteropodidæ*. First upper premolar close to the canine, separated by a slight interval from the next tooth, larger than any of the suc-

ceeding teeth, chisel-shaped, with two roots; second premolar smaller, but larger than the first molar, which also exceeds the second and last molar; in the lower jaw the teeth are somewhat larger, but similarly proportioned.

Tongue very long, much attenuated in anterior third, and armed with recurved papillæ near the tip.

Length (of an adult ♂), head and body 4″, tail 2″·3, head 1″·5, eye from nose 0″·6, ear 0″·6, forearm 2″·6, thumb 0″·85, third finger 5″·3, fifth finger 3″·6, tibia 1″·35, calcaneum 0″·25, foot 0″·85.

Hab. Fiji Islands; Aneiteum Island.

a, b. ♂ & ♀ ad. sk.	Viti Levu, Fiji.	Dr. J. D. Macdonald [C.].
	(Figured in P. Z. S. 1859. Type of the species.)	
c. ♂ ad., al.	Aneiteum Island.	
d, e. skulls.	Viti Levu, Fiji.	

8. EONYCTERIS.

Eonycteris, *Dobson, Journ. Asiat. Soc. Beng.* 1873, p. 204; *Monogr. Asiatic Chiropt.* p. 32 (1876).

Muzzle long, cylindrical; nostrils scarcely projecting, simple, separate; upper lip with a shallow vertical groove in front; index finger without a claw; thumb short, part of terminal phalanx included in the wing-membrane; metacarpal bone of second finger equal to the index finger in length; wings from the sides of the hairy back; wing-membrane from the base of the first toe; tail short, distinct, the base contained in the narrow interfemoral membrane.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

First upper premolar small; all the molars narrow and very slightly elevated above the gum, as in *Macroglossus*; tongue very long and armed with long recurved papillæ as in that genus.

1. Eonycteris spelæa.

Macroglossus spelæus, *Dobson, P. A. S. B.* 1871, p. 106; *J. A. S. B.* 1871, p. 261, pl. x. figs. 3 & 4.
Eonycteris spelæa, *Dobson, J. A. S. B.* 1873, p. 204, pl. xiv. fig. 10.

Head long; muzzle narrow, cylindrical, abruptly narrowed in front of the eyes; nostrils not prominent, with an intervening emargination, which also passes down to the lip; ears conical, with rounded tips.

Wings ample, from the sides of the hairy back; wing-membrane attached to the back of the foot, and extending to the base of the outer toe; thumb rather short, terminal phalanx longest, with its base included in the membrane; index finger of three phalanges, the terminal phalanx very short and wholly contained within the wing-membrane, not ending in a claw.

Body clothed with very short and thinly spread fur of a uniform

dark brown colour. The fur of the head extends upon the face as far as the inner canthuses of the eyes, leaving the remaining portions naked; from the back it passes on to the humerus and forearm, covering half the length of the latter; behind, on each side, it covers a triangular portion of the interfemoral membrane, bounded laterally by the femur, and posteriorly by a line drawn from the knee-joint to the base of the free portion of the tail; beneath, the whole surface of the antebrachial membrane is covered with short hairs; laterally, the fur of the sides extends upon the wing-membrane as far as a line drawn between the elbow- and knee-joints, also outwards along the posterior margin of the forearm to the carpus, occupying a space varying in width from one inch behind the elbow to half an inch or less at the middle of the forearm; the under surface of the humerus and femur and half the length of the forearm are also hairy.

Tail about half an inch in length, half contained in the narrow interfemoral membrane as in *Cynonycteris*. On each side of and a little behind the anal opening two small, subcutaneous, gland-like bodies are placed.

These bodies are kidney-shaped, their convex margins directed outwards; and they are found in both male and female. In males in whom the testes have descended, one of these postanal glands forms on each side the posterior boundary of the temporary scrotum, which, in this situation only, is quite naked and covered by very thin skin.

The tongue is very long, pointed, and protrusible; in spirit specimens it can be drawn from the mouth for nearly half an inch without using any forcible extension; the anterior half of its surface is thickly covered with soft recurved papillæ, which increase very much in length towards the tip.

The teeth are very similar to those of *Macroglossus minimus*, except the first upper premolar, which is minute. The upper incisors are arranged triangularly; they are very small, scarcely raised above the level of the gum, and are separated from each other by regular intervals.

Length (of an adult ♂), head and body 4″·5, tail 0″·55, head 1″55. ear 0″·75 × 0″·45, ear to tip of nose 1″·35, eye to tip of nose 0″·55, forearm 2″·85, thumb 0″·85, first finger 1″·8, third finger 4″·9, fourth finger 3″·8, fifth finger 3″·3, tibia 1″·2, foot 0″·75.

Hab. Burma (Farm Caves, Moulmein).

a. ad., al.	Moulmein.	Calcutta Museum [E.].
b. skull.	Burma.	G. E. Dobson, M.B. [P.].

9. MACROGLOSSUS.

Macroglossus, *F. Cuvier, Dents des Mammif.* p. 40 (1825); *Temm. Monogr. Mammal.* ii. p. 96 (1835–41); *Gray, Proc. Zool. Soc. Lond.* 1866, p. 64; *Peters, Monatsber. Akad. Wissensch. Berl.* 1867, p. 870; *Dobson, J. A. S. B.* 1873, p. 204; *Monogr. Asiat. Chiropt.* p. 34 (1876).

Muzzle cylindrical, very long and narrow; nostrils not projecting; upper lip not grooved in front; tongue very long and attenuated; ears simple, separate; index finger with a distinct claw; metacarpal bone of second finger equal to or longer than index finger; wings from the sides, their points of attachment separated by a considerable interval from the spine; wing-membrane *from the base of the fourth toe*; tail very short.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$. Upper incisors in a triangular series; molars very small and weak.

1. Macroglossus minimus.

Pteropus minimus, *Geoffroy, Ann. du Mus.* xv. p. 97 (1810).
Pteropus rostratus, *Horsfield, Zool. Research. in Java* (1825).
Macroglossus minimus, *Temminck, Monogr. Mammal.* i. p. 191, ii. p. 96 (1835–41); *Horsfield, Cat. Mammal. Mus. E. I. Comp.* p. 29 (1851); *Gray, Proc. Zool. Soc. Lond.* 1866, p. 64; *Peters, Monatsb. Akad. Wissensch. Berl.* 1867, p. 871; *Gray, Cat. Monkeys and Fruit-eating Bats*, 1870, p. 115; *Dobson, J. A. S. B.* 1873, p. 205; *Monogr. Asiat. Chiropt.* pp. 34, 35, fig.
Macroglossa minima, *Gray, Mag. Zool. & Bot.* ii. p. 504 (1838).

Ears scarcely more than half the length of the head, narrow, rounded at the tip; face abruptly narrowed in front of the eyes; muzzle very long, narrow, and cylindrical; nostrils not prominent, the slight groove between them not passing down to the upper lip; lower jaw projecting slightly beyond the upper jaw in front; eyes large; tongue very long, attenuated in its terminal third, covered with numerous long brush-like papillæ, capable of being protruded to a considerable distance from the mouth.

Interfemoral membrane very narrow, reduced to a scarcely perceptible band at the root of the tail, which in most specimens is so small as to be quite concealed by the fur.

Fur reddish brown, and much longer than in most of the species of *Pteropodidæ*.

Upper incisors in a triangular series, very small, scarcely raised above the level of the gum, each tooth separated from the next by an interval, which is widest between the two central teeth. Upper premolars nearly equal in size, with single subacute cusps slanting forwards, each premolar separated by a considerable interval from the next. Molars with very narrow horizontal crowns, scarcely raised above the level of the gum.

Length (of an adult ♀ preserved in alcohol), head and body 2″·3, tail 0″·3, head 1″, ear to tip of nostril 0″·8, eye to tip of nostril 0″·4, ear 0″·6 × 0″·35, forearm 1″·55, thumb 0″·6, third finger 3″, fifth finger 2″·2, tibia 0″·6, foot 0″·35.

Hab. From the Himalaya (Darjiling) through Burma to the Malay Archipelago and North and West Australia. Probably distributed throughout all the islands of the Malay Archipelago, and extending as far east as New Ireland.

a. ♀ ad. sk.	Java.	
b. ad. sk.	Java.	
c. ♂ imm. sk.	Java.	General Hardwicke [P.].
d. ♂ ad. sk.	Java.	E. I. Company [P.].
e. ad. sk.	Mysol Island.	
f. ♀ ad., al.	Philippine Islands.	Zool. Soc. Coll.
g, h. ♂ and ♀ ad., al.	Philippine Islands.	Zool. Soc. Coll.
i, j. ad. sks.	Duke of York Island.	Rev. G. Brown [C.].
k, l. ♂ and ♀ ad., al.		M. Lidth de Jeude.
m. skull.		

10. MELONYCTERIS.

Melonycteris*, *Dobson, P. Z. S.* 1877, p. 119.

Muzzle long, narrow, cylindrical; nostrils projecting slightly; upper lip with a vertical groove bounded laterally by naked raised edges, as in *Pteropus* and *Cynopterus*; index finger with a distinct claw; metacarpal bone of middle finger as long as the index finger; wing-membrane from the sides of the body and from the dorsal surface of the base of the middle toe; tail none.

Dentition. Inc. $\frac{4}{2-2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{2-2}{3-3}$.

First upper and lower premolars very small, close to the base of the canines; molars close together, very narrow, scarcely elevated above the gum.

Tongue very long and narrow, as in *Macroglossus*.

This genus is most closely related to *Macroglossus*, with which it agrees in the general form of the skull and in the mode of attachment of the wing-membrane to the sides of the body, but is distinguished by the very different position and size of the first premolars, by the origin of the wing-membrane from the middle toe instead of from the base of the fourth, and by the form of the extremity of the muzzle.

1. Melonycteris melanops.

Melonycteris melanops, *Dobson, P. Z. S.* June 1877, p. 119, figs. 4–7 and pl. xvii.

Pteropus (Cheiropteruges) alboscapulatus, *Pierson Ramsay, Proc. Linn. Soc. New South Wales*, July 1877, p. 17.

Slightly smaller than *Eonycteris spelæa*, Dobson, which it resembles closely in the external form of the muzzle; nostrils as in *Cynonycteris amplexicaudata*, but scarcely so prominent, separated by a deep groove which passes down to the upper lip, where it becomes narrower and is margined as in *Cynopterus* by raised naked edges; tongue very long, much attenuated in terminal fourth, armed with long recurved brush-like papillæ; ears about as long as the muzzle, oval, rounded off above, the outer and inner margins of the ear-conch equally convex, so that the ear attains its greatest width in the middle.

Interfemoral membrane very short behind; no trace of a tail in

* μῆλον, tree-fruit; νυκτερίς, a bat.

either of the specimens. Wing-membrane from the base of the middle toe, or from the space between the second and middle toe, and from the sides of the body.

Fur moderately short, but very dense, extending thickly upon the wing-membrane as far outwards as a line drawn from the elbow to the knee, and more thinly for a considerable distance beyond, and also covering the short interfemoral membrane and the legs.

Above, bright reddish yellow, the base of the hairs dark; on each shoulder, at the point of origin of the antebrachial membrane, a small patch of white hairs; crown of the head greyish yellow, the base of the hairs dark brown; a large patch round each eye dark brown, almost black; anterior half of the muzzle pale buff, a narrow streak of the same colour passing backwards between the eyes; the whole under surface of the body dark brown, almost black, the extremities of the hairs greyish; the fur on the sides of the body longer, and the terminal half of the hairs brownish buff.

Upper incisors small, forming a semicircle in front and separated from the canines by a wide space on either side, central incisors somewhat larger than the outer ones and converging slightly; lower incisors very small, in pairs separated by a space between; upper canines remarkably long and strong, deeply grooved anteriorly by a longitudinal furrow; first upper premolar exceedingly small, and so close to the canine as to appear to be a small basal projection from that tooth; second premolar larger than any of the other teeth (except the canines), in the centre of the wide space between the canine and first molar; third premolar shaped like the second premolar, but much smaller and close to the first molar; molars very narrow, scarcely raised above the gum; first lower premolar larger than the corresponding tooth in the upper jaw, but still very small and similarly placed close to the canine, and separated from the second premolar by a wide space equal to the distance between the lower canines; second lower premolar scarcely larger than the third and separated from it by a wide space; third premolar close to the first molar; molars close together, very narrow, their roots and those of the other teeth in both jaws visible through the exceedingly thin translucent alveoli.

The molar teeth in this species appear to be proportionately smaller than in any other known species of *Megachiroptera*, while the canines are long and stronger.

Length (of an adult ♂), head and body 4″, head 1″·4, eye from nose 0″·55, ear 0″·6, forearm 2″·4, thumb 0″·85, first finger 1″·9; second finger—metacarp. 1″·85, 1st ph. 1″·35, 2nd ph. 1″·9; fourth finger—metacarp. 1″·9, 1st ph. 0″·8, 2nd ph. 0″·8; tibia 1″·05, calcaneum 0″·3, foot and claws 0″·7.

Hab. Duke of York Island, New Ireland.

a. ♂ ad. sk. (type). Duke of York Island. Rev. G. Brown [C.].
(Figured in P. Z. S. 1877, pl. xvii.)
b. ♀ ad. sk. (in alcohol). Duke of York Island. Rev. G. Brown [C.].
c. skull of *b*. (Teeth figured in P. Z. S. 1877, p. 120.)

Suborder II. MICROCHIROPTERA.

Family RHINOLOPHIDÆ.

Rhinolophidæ, *Gray* (in part), *P. Z. S.* 1866, p. 81; *Dobson, Ann. & Mag. Nat. Hist.* 1875, xvi. p. 346; *Monogr. Asiat. Chiropt.* p. 36 (1876).

Bats with well-developed foliaceous cutaneous appendages surrounding the nasal apertures, which are situated in a depression on the upper surface of the muzzle; with large, generally separated ears, without a tragus; with two phalanges in the middle finger, and an imperfect index finger without a phalanx; and with rudimentary premaxillary bones suspended from the nasal cartilages. The dental formula never exceeds

$$\text{Inc.}\ \tfrac{2}{4},\ \text{c.}\ \tfrac{1-1}{1-1},\ \text{pm.}\ \tfrac{2-2}{3-3},\ \text{m.}\ \tfrac{3-3}{3-3},\ =32\ \text{teeth.}$$

The number of premolars varies from $\frac{2-2}{3-3}$ to $\frac{2-2}{2-2}$ or $\frac{1-1}{2-2}$. The upper incisors are quite rudimentary, placed at the extremities of the slender premaxillary bones in the centre of the space between the canines, and separated by an interval; the first upper premolar is minute; the molars are well developed, with acute W-shaped cusps.

The very complicated nasal appendages consist of three parts, the homologies of which may generally be easily traced throughout the different genera and species:—(1) the horizontal nose-leaf, generally horseshoe-shaped, which more or less covers the sides and anterior extremity of the muzzle, and includes within its inner margin the nasal apertures, between or behind which a central process or ridge (2), the central nose-leaf or sella, is placed; while more posteriorly (3) the terminal or posterior nose-leaf arises vertically, or extends backwards between the ears.

The skull is large; and the nasal bones, which support the large nasal cutaneous appendages, are much expanded vertically and laterally. Tibia long and straight; fibula rudimentary. Females with two nipple-shaped appendages slightly in front of the pubis. Tail distinct, produced to the posterior margin of the interfemoral membrane.

These Bats are readily distinguished by the form of their nasal appendages, and by their rudimentary premaxillary bones supporting two minute, usually bilobed incisors; their molars are acutely tubercular, and enable them to crush with ease the hard cases of

insects, especially Coleoptera, which, from remains found in their stomachs, seem to constitute a very large proportion of their food.

From whatever point of their structure they may be considered, the Rhinolophidæ are evidently the most highly organized of insectivorous Bats. In them the osseous and cutaneous systems reach the most perfect development. Compared with theirs the bones of the extremities and the volar membranes of other Bats appear coarsely formed, and even their teeth seem less perfectly fitted to crush the hard bodies of insects. The very complicated nasal membranes, which evidently act as delicate organs of special perception akin to the sense of touch, here reach their highest development in *Chiroptera*; and the differences in their form afford valuable characters in enabling us to distinguish the different species which agree together remarkably in dentition, and in the form and relative lengths of the bones of their extremities, as well as in the colour and distribution of their fur, which rarely extends upon the membranes.

In their habits they appear to differ from other insectivorous Bats without nasal appendages, inhabiting the same regions, by coming out later in the evening, or when the sun has completely gone below the horizon. This peculiarity is probably connected with their possession of special organs of touch in the complicated nose-leaf, and delicately formed ears and membranes, which may permit them to commence and continue their hunt for insect prey at a time when other Bats have retired to their sleeping-places.

Hab. Temperate and tropical parts of the eastern hemisphere, from Ireland to New Ireland. As yet no species has been recorded, with certainty, from any part of the Polynesian Subregion.

Subfam. I. RHINOLOPHINÆ.

First toe with two, remaining toes with three joints each; iliopectineal spine not connected by bone with the antero-inferior surface of the ilium.

1. RHINOLOPHUS.

Rhinolophus, *Geoffroy, Desm. Nouv. Dict. d'Hist. Nat.* 1803, xix. p. 383; *Bonaparte, Saggio di una distrib. anim. vertebr.* 1831, p. 16; *Peters, MB. Akad. Berl.* 1871, p. 303; *Dobson, Monogr. Asiat. Chiropt.* p. 37 (1876).

Aquias, Phyllotis, Rhinolophus, *Gray, P. Z. S.* 1866, p. 81.

Nose-leaf very complicated, consisting of three distinct portions —anterior, central, and posterior; the anterior horizontal portion is horseshoe-shaped, usually angularly emarginate in front, containing within its circumference the nasal orifices and the central erect nasal process; the posterior nose-leaf is triangular, erect, with cells on its anterior surface; the central process rises between and behind the nasal orifices, is flattened anteriorly, and posteriorly sends back-

wards a vertical, laterally compressed process, which is either connected with the front surface of the posterior nose-leaf or free. Base of the outer side of the ear expanded, forming a large antitragus. Wings very large; metacarpal bone of fourth finger exceeding that of second in length. Basioccipital very narrow between the auditory bullæ, in most species linear; cochleæ prominent, deeply grooved externally; foramen rotundum united with sphenoidal fissure.

Dentition. Inc. $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

Second lower premolar generally minute and placed outside the tooth-row; first upper premolar minute, pointed, standing in the tooth-row or lying in the outer angle between the closely approximated canine and second large premolar.

Range. Temperate and tropical parts of the eastern hemisphere —from Ireland to Japan, from South Africa to Australia, New Guinea and New Ireland.

In temperate regions the species hibernate in dry and warm hiding-places during the winter, not venturing abroad while any cold remains; in tropical and subtropical countries they are fond of frequenting hill-ranges; and many of the species are clothed with remarkably long and dense fur.

Synopsis of the Species.

A. Second upper premolar separated from the canine by a rather wide space, in the centre of which the first small premolar is placed; second lower premolar small, but distinctly visible, placed in the outer angle between the adjoining premolars, or (rarely) standing in the tooth-row.

a. Central nose-leaf or *sella* not united with the terminal portion of the nose-leaf, the posterior extremity of the connecting process being received into a concavity in the front surface of the terminal lancet-shaped leaf.

1. Antitragus large, separated posteriorly by a deep angular notch; forearm 1″·85 ..... *Rh. cœlophyllus*, p. 104.

b. Central nose-leaf or *sella* united posteriorly by a laterally flattened band (*the posterior connecting-process*) with the upper and front surface of the base of the terminal nose-leaf.

b′. Horizontal portion of the sella expanded, much wider than the base of its vertical process.

b″. Sides of the base of the sella folded inwards and backwards.

2. Summit of the vertical process of the sella broadly rounded off or truncated; forearm 2″·0 ..... *Rh. luctus*, p. 105.

3. Summit of the vertical process of the sella narrowly rounded off or subacute; forearm 2″ ..... *Rh. trifoliatus*, p. 106.

c″. Sides of the base of the sella turned upwards, forming a cup-shaped cavity above and between the nasal orifices.

4. Antitragus separated posteriorly by a shallow notch; lower lip with a single groove; forearm 2″·25 .. *Rh. mitratus*, p. 107.

5. Antitragus separated by a deep angular groove; lower lip with three grooves; forearm 1″·85 ..... *Rh. philippinensis*, p. 107.

d″. Sides of the base of the sella forming rather long triangular projections.

6. Horseshoe-shaped membrane divided in front by a longitudinal groove with raised edges; forearm 2″·2.. *Rh. euryotis*, p. 108.

c′. Horizontal portion of the sella not expanded, scarcely wider than the base of its vertical process.

e″. Upper margin of the posterior connecting-process of the sella conjoined with the summit of the vertical process at the same level, not exceeding it posteriorly in height.

7. Vertical process of the sella narrowed abruptly about the middle and rounded off above; lower lip with a single vertical groove; forearm 2″·2 ..... *Rh. pearsonii*, p. 108.

8. Sides of the vertical process of the sella straight, summit triangular; lower lip with three grooves; forearm 2″·1 ..... *Rh. rufus*, p. 109.

f″. Upper margin of the posterior connecting-process exceeding the summit of the anterior vertical process in height.

f‴. Upper margin of the posterior connecting-process forming a low rounded projection, slightly exceeding the summit of the vertical process of the sella in height.

α. Vertical process of the sella broad, as broad as the horizontal portion above the nostrils.

9. Ears longer than the head; forearm 1″·6 ..... *Rh. macrotis*, p. 110.

β. Vertical process of the sella narrower than the horizontal portion.

α′. Ears as long as the head.

10. Horseshoe-shaped nose-leaf broad, concealing the muzzle; forearm 1″·9, thumb 0″·3 ..... *Rh. megaphyllus*, p. 110.

β'. Ears shorter than the head.
12. Horseshoe-shaped nose-leaf broad, concealing the muzzle; forearm 2″·05, thumb 0″·45 ..... *Rh. andamanensis*, p. 113.
11. Horseshoe-shaped nose-leaf leaving the sides of the muzzle uncovered; forearm 2″·1, thumb 0″·35 ..... *Rh. affinis*, p. 112.

g‴. Upper margin of the posterior connecting-process forming a more or less acute projection, exceeding considerably the summit of the vertical process of the sella in height.
γ. Sides of the vertical process of the sella parallel, summit broadly rounded off.
γ'. Antitragus separated posteriorly by a deep angular notch.
γ″. Terminal process of the posterior nose-leaf short and narrow.
13. Wings from the metatarsi or from base of the toes; forearm 1″·9 ..... *Rh. acuminatus*, p. 113.
14. Wings from the ankles; forearm 2″ ..... *Rh. petersii*, p. 114.
15. Wings from the ankles; forearm 1″·5 ..... *Rh. minor*, p. 114.
δ″. Terminal process of the posterior nose-leaf broad, forming an equilateral triangle.
16. Wings from the ankles; forearm 1″·3 ..... *Rh. garoensis*, p. 115.
δ'. Antitragus separated posteriorly by a shallow notch.
17. Wings from the tibiæ above the ankles; forearm 1″·8.. *Rh. euryale*, p. 116.
Sides of the vertical process of the sella converging upwards.
ε'. Antitragus separated posteriorly by a shallow notch.
18. Wings from the ankles; forearm 1″·8 ..... *Rh. blasii*, p. 117.
ζ'. Antitragus separated posteriorly by a deep angular notch.
19. Wings from the ankles; forearm 1″·5 ..... *Rh. hipposideros*, p. 117.
ε. Sides of the vertical process of the sella concave.
η'. Antitragus separated posteriorly by a shallow notch.
20. Wings from the ankles or tibiæ; forearm 1″·7..... *Rh. landeri*, p. 118.

B. Second upper premolar close to the canine, the first small premolar either quite external to the tooth-row or wedged in between the canine and second premolar; second lower premolar very small, generally with difficulty distinguished, always external to the tooth-row *.

η″. Ears not attenuated near their extremities; first upper premolar wedged in between the canine and second premolar, or half external.

22. Ears much shorter than the head; forearm 1″·75 — *Rh. clivosus*, p. 120.

23. Ears as long or longer than the head; forearm 1″·9 ..... — *Rh. capensis*, p. 121.

θ″. Ears attenuated near their extremities; first upper premolar quite external to the tooth-row.

24. Ears shorter than the head, obtusely pointed; horseshoe-shaped nose-leaf broad, concealing the muzzle; forearm 2″·2 .. — *Rh. æthiops*, p. 122.

21. Ears shorter than the head, very acutely pointed; horseshoe small, not concealing the sides of the muzzle; forearm 2″·25 ..... — *Rh. ferrum-equinum*, p. 119.

1. Rhinolophus cœlophyllus.

Rhinolophus cœlophyllus, *Peters, P. Z. S.* 1866, p. 426, pl. xxiv.; *Dobson, Monogr. Asiat. Chiropt.* p. 53 (1876).

Ears large, with narrow acute tips projecting outwards; antitragus separated by an angular emargination from the outer margin of the ear; horseshoe well developed; horizontal margins of central nose-leaf triangular, small; erect portion rather short, with parallel sides and rounded summit meeting the connecting vertical process at the same level; this process is thick and long, its posterior portion is not connected with the posterior terminal leaf, but is received into an opening in its front surface; the posterior leaf is shortly triangular in outline, formed of very thick integument, and its surface is marked by a crucial aperture leading into a deep cavity lined with hairs; the lower part of this aperture receives the posterior extremity of the connecting nose-leaf (Plate VII. fig. 1). The surface of the terminal leaf is covered with rather long hairs, its inferior

* Although this division occurs here, necessitated by dental characters, the synoptical table is carried on from above, as if it were not present, in order to show the connexion of the species in other respects.

surface is convex and rests on the forehead, which is naked in this situation. Chin marked with three small vertical grooves.

Wings from the ankles or from the tibiæ a short distance above.

Interfemoral membrane narrow, concave or straight behind; tip of tail projecting.

The second upper premolar is separated from the canines by a space, in the midst of which the small first premolar stands; the second lower premolar is minute and external to the tooth-row.

Fur, above white at the base, with brown extremities, beneath pale brownish white.

Length, head and body 2″, tail 0″·8, ear 0″·8, forearm 1″·85, thumb 0″·3, third finger 2″·8, fifth finger 2″·2, tibia 0″·85, foot 0″·4, nose-leaf 0″·5 × 0″·4.

Hab. Moulmein; Tsagine, Upper Burma.

Type in the collection of the Berlin Museum.

a. ad., al.	Tsagine, Upper Burma.	Dr. J. Anderson [C.].

2. Rhinolophus luctus.

Rhinolophus luctus, *Temminck, Monogr. Mammal.* ii. p. 24, pl. xxx.; *Peters, MB. Akad. Berl.* 1871, p. 304; *Dobson, Monogr. Asiatic Chiroptera*, p. 39 (1876).

Rhinolophus luctus, var. rufus, *Eydoux et Gervais, Voy. Favor. Zoologie*, 2e part. (1839).

Rhinolophus morio, *Gray, Ann. & Mag. Nat. Hist.* 1842, p. 257.

Rhinolophus perniger, *Hodgson, Journ. As. Soc. Beng.* xii. p. 414, xiii. p. 484; *Horsfield, Cat. Mamm. Mus. E. I. Comp.* (1851).

Aquias luctus, *Gray, P. Z. S.* 1847, p. 17; *id.* 1866, p. 81.

This fine species, by far the largest of the genus yet discovered, is distinguished not only by its size but also by the great development and peculiar form of the nasal appendages (Plate VII. fig. 2).

The base of the sella is expanded on either side, forming a long lobe, almost equal in size and similar in shape to the vertical process; this lobe is twisted on its base so as to lie with its upper surface partly on the central process of the sella, partly on the horseshoe-shaped nose-leaf. The horseshoe-shaped horizontal nose-leaf is very large, projecting in front and on either side beyond the upper lip. The posterior nose-leaf is developed in proportion to the other parts, and extends backwards between the ears. The lower lip is divided by a single deep vertical groove. The acutely pointed ears are enormous, even in proportion to the size of the animal, and the leaf-like antitragus is separated from the outer margin of the ear by a very deep angular incision.

The wing-membrane is greatly developed, and attached to the base of the outer toe; the interfemoral membrane is large, triangular behind, and the tail is wholly contained within it.

The fur of the body is very long and dense, usually of a jet-black colour, with grey tips, which suggested the specific name "*luctus*;" the colour, however, as in other *Rhinolophi*, varies considerably according to age, sex, and locality; and specimens have been ob-

tained presenting every shade between reddish brown and intense black.

Length (of an adult ♀), head and body 3″·55, tail 2″·6, head 1″·45, nose-leaf 1″·3 × 0″·65, ear 1″·65, antitragus 0″·7, forearm 2″·95, thumb 0″·45; third finger—metacarp. 2″, 1st ph. 1″, 2nd ph. 1″·7; fifth finger—metacarp. 2″·25, 1st ph. 0″·6, 2nd ph. 1″·05; tibia 1″·5, foot 0″·9.

Hab. India (Western Ghâts; Himalaya—Nipal, Masuri, Darjeeling, Sikkim; Khasia Hills); Ceylon; Java; Sumatra; Borneo; Philippine Islands.

This species appears to be restricted to the highlands of the countries inhabited by it. In the Himalaya the late Capt. T. Hutton found it at an elevation of 5500 feet. (For notes on habits of *Rh. luctus*, see my 'Monograph of the Asiatic Chiroptera,' pp. 40, 41).

a. ♀ ad., al.	India.	E. I. Company [P.].
b. ♀ imm., al.	Ceylon.	
c. ad. sk.	Malacca.	

3. Rhinolophus trifoliatus.

Rhinolophus trifoliatus, *Temminck, Monogr. Mammal.* ii. p. 27, pl. 31; *Wagner, Suppl. Schreb. Säugeth.* v. p. 663; *Dobson, Monogr. Asiat. Chiropt.* p. 41 (1876).

Aquias trifoliata, *Gray, P. Z. S.* 1847, p. 17; 1866, p. 81.

Very similar to *R. luctus* in structure and even in the colour and length of the fur; distinguished by its smaller size and by the subacute summit of the anteriorly flattened vertical process of the central nose-leaf, which in *R. luctus* is truncate (Plate VII. fig. 3). The free edge of the interfemoral membrane is straight; and the tip of the tail abruptly projects.

Length, head and body 2″·3, tail 1″·3, ear 1″, nose-leaf 0″·75 × 0″·45, forearm 2″, thumb 0″·3, third finger 3″·15, fifth finger 2″·85, tibia 0″·95, foot 0″·5.

Hab. India (eastern coast), Java, Borneo.

Type in the collection of the Leyden Museum.

Rhinolophus luctus and *R. trifoliatus* were placed by Dr. J. E. Gray in a separate subgenus *Aquias*—on insufficient grounds however; for the form of the nose-leaf in these species differs only in the greater development of its parts, not in any important structure, from that of most species of this genus. As well might they have been separated on account of the remarkable length of the fur of the body.

On the same principle the subgenus *Phyllotis*, Gray, was formed for the reception of *Rhinolophus philippinensis*, Waterhouse (*vide infra*, p. 107), with which *R. mitratus*, Blyth, should necessarily be placed.

a. ♂ ad., al.	North Borneo.	
b. ad. sk.	N.W. Borneo.	
c. ♂ ad., al.	Matang.	Purchased.
d. ad. sk.	No history.	

4. Rhinolophus mitratus.

Rhinolophus mitratus, *Blyth, Journ. Asiat. Soc. Beng.* xiii. p. 483, xxii. p. 409; *Dobson, Monogr. Asiat. Chiropt.* p. 42, figs. *a, b* (1876).

Ears large, with a broad well-developed antitragus separated from the outer margin by a shallow angular notch; anterior vertical process of the sella short, rounded off above, the posterior connecting-process supporting its base only; horizontal base of the sella between the nostrils much expanded, the expanded sides turned upwards forming a deep cup-shaped cavity; terminal nose-leaf triangular, acutely pointed, extending backwards between the ears. Lower lip with a single groove.

Fur above brown, paler at the base; beneath a lighter shade of the same colour.

Length, head and body 2″·4, tail 1″·6, ear (anteriorly) 1″, forearm 2″·25, third finger 3″·4, fifth finger 2″·8, tibia 1″, foot 0″·5.

Hab. Peninsula of India (Chaibása).

Type in the collection of the Indian Museum, Calcutta.

This species resembles the next very closely in the form of the central nose-leaf, but it may be readily distinguished by the much shorter and broader terminal portion of the nose-leaf, by the form of the outer margin of the ear, by the single groove in the lower lip, and also by its greater size.

5. Rhinolophus philippinensis.

Rhinolophus philippinensis, *Waterhouse, P. Z. S.* 1843, p. 68; *Peters, MB. Akad. Berl.* 1871, p. 305; *Dobson, Monogr. Asiat. Chiropt.* p. 43 (1876).

Phyllotis philippensis, *Gray, P. Z. S.* 1866, p. 81.

Ears large, subacute, the upper third of the outer margin slightly concave; antitragus large and deep; horizontal horseshoe-shaped nose-leaf broad, concealing the muzzle; base of the central leaf expanded, with turned-up edges, forming a deep cup between and above the nostrils; vertical process of the central leaf broad, not diminishing in width upwards, truncate above; posterior vertical connecting-process convex on upper margin, not so high as the summit of the central leaf; posterior nose-leaf long, narrow, and acute (Plate VII. figs. 4, 4 *a*). Lower lip with three grooves.

Wings to the ankles. Interfemoral membranes square behind, extreme tip of tail alone projecting.

Fur above and beneath dark brown, slightly paler beneath.

Length (of an adult ♂ preserved in alcohol, the type), head and body 1″·95, tail 1″·1, ear 1″, antitragus 0″·5 × 0″·3, forearm 1″·85, thumb 0″·32, third finger 2″·7, fifth finger 2″·1, tibia 0″·85, foot 0″·35.

Hab. Philippine Islands.

a.	♂ ad., al. (type).	Philippine Islands.	Zool. Soc. Coll.

6. Rhinolophus euryotis.

Rhinolophus euryotis, *Temminck, Monogr. Mammal.* ii. p. 26, pl. 29. fig. 5, pl. 32. figs. 13, 14, 15; *Peters, MB. Akad. Berl.* 1871, p. 305.

Ears large, very similar to those of *Rh. affinis*, but less acute, and the outer margin more deeply concave immediately beneath the tip; nose-leaf broad, the horizontal leaf concealing the muzzle, and even projecting slightly beyond it, divided in front by a longitudinal groove with raised edges, which is bounded behind and separated from the commencement of the horizontal base of the sella by a short erect projection (Plate VI. fig. 1 *a*); base of the sella with a triangular lappet on either side concealing the nostrils, the erect process expanded above, with strongly convex sides and rounded summit, scarcely exceeded in height by the rounded upper margin of the connecting-process; terminal leaf acute, but its extremity not attenuated. Lower lip with three grooves.

Tail very short; interfemoral membrane square or concave behind; last rudimentary caudal vertebra projecting. Wings from the lower end of the tibia near the ankles; feet very long (Plate VI. fig. 1)*.

Fur light brown above, buffy brown beneath.

First upper premolar in the outer side of the space between the canine and second premolar; lower incisors trifid, not crowded.

Length, head and body 2″·4, tail 0″·7, ear 0″·9, forearm 2″·2, thumb 0″·35; third finger—metacarp. 1″·55, 1st ph. 0″·65, 2nd ph. 1″·1; fifth finger—metacarp. 1″·6, 1st ph. 0″·5, 2nd ph. 0″·6; calcaneum 1″, foot 0″·5.

Hab. Amboina; Aru Islands.

a. ad. sk., in al.	A. R. Wallace, Esq. [C.].
b. ad. sk.	A. R. Wallace, Esq. [C.].

7. Rhinolophus pearsonii.

Rhinolophus pearsonii, *Horsfield, Cat. Mamm. Mus. E.I. Comp.* (1851), p. 33; *Dobson, Monogr. Asiat. Chiropt.* p. 43, figs. *a*, *b* (1876).

Rhinolophus larvatus, *A. Milne-Edwards, Mammif. du Tibet*, pp. 248, 249, pl. xxxvii. fig. i., xxxvii^{c}. fig. i. (1872).

Rhinolophus yunanensis, *Dobson, J. A. S. B.* 1872, p. 336.

Ears large, acutely pointed: outer margin deeply hollowed out beneath the tip; antitragus long, separated from the outer margin of the ear by an acute angular notch. Nose-leaf large; horseshoe broad, projecting laterally and in front beyond the upper lip so as to completely conceal the muzzle when viewed from above; base of the sella between the nostrils moderately broad, the vertical portion maintaining the same width for half its height, then abruptly narrowing and rounded off above, meeting at the same level (as in *Rh.*

* I have had the figure of this species drawn full size, with nose-leaf enlarged, as the figure given by Temminck is very imperfect, and a thorough knowledge of its characters is necessary in order to understand the synoptical table at p. 102, *antea*.

rufus) the upper margin of the connecting process, which does not rise above it; terminal leaf short and broadly triangular, sides slightly convex, almost straight. Lower lip with a single groove.

Wings remarkably wide; wing-membrane from the ankle. Tail short and contained, except the extreme tip, within the interfemoral membrane, the posterior free margin of which is concave.

Fur uniformly dark brown above and beneath, *very long and dense*.

Length, head and body 2″·7, tail 0″·9, head 1″, ear 1″, antitragus 0″·4, nose-leaf 0″·7 × 0″·45, forearm 2″·2, thumb 0″·35, third finger 3″·3, fifth finger 3″, tibia 1″, foot 0″·5.

Hab. India (Masuri, Darjiling, Khasia and Garo hills, Tupai Mukh), Tibet, Yunan (Hotha).

This Bat (easily recognised by the great length of its fur, in which it resembles *Rh. luctus*) appears to be an inhabitant of very elevated hill-countries, extending from the N.W. Himalaya, Tibet, and Assam to the mountain-tracts lying between Burma and China.

The type has lain for many years in the collection of the East-India House, packed away among other objects of natural history, until very recently, quite inaccessible to any one. This, and the very imperfect description by Mr. Horsfield, have led to other names being applied to this very well-marked species, which I immediately recognised on examining the type.

8. Rhinolophus rufus.

Rhinolophus rufus, *Peters, MB. Akad. Berl.* 1861, p. 710; *Dobson, Monogr. Asiat. Chiropt.* p. 44 (1876).
Rhinolophus euryotis, *Peters* (*non Temminck*), *l. c.* 1861, p. 710.
Rhinolophus arcuatus, *Peters, l. c.* 1871, p. 305.

Ears large, as long as the head, very acute; antitragus separated from the outer margin by a deep acute-angled emargination. Nose-leaf large, the horseshoe concealing the muzzle, deeply divided in front; the central erect process of the sella rather broad, with parallel sides and rounded summit, meeting the superior margin of the posterior connecting process (which is not raised above it) at the same level. Lower lip with three grooves.

Wing-membrane from the tarsus.

Fur reddish brown or dark brown above and beneath, moderately long and dense.

Length, head and body 3″, tail 1″, head 1″, ear 1″, nose-leaf 0″·8 × 0″·5, forearm 2″·1, third finger 3″·2, fifth finger 2″·7, tibia 1″·1, foot 0″·5.

Hab. Philippine Islands (Luzon).

Type in the collection of the Berlin Museum.

Rh. arcuatus, Peters, differs from *Rh. rufus* in size only, and is probably a local form of the same, as *Scotophilus luteus*, Blyth, and *Sc. temminckii*, Horsf.

This species resembles *Rh. pearsonii* closely in size and in the form of the nose-leaf, but may be at once distinguished by the

additional grooves in the lower lip, and by the very different quality of the fur, which is not longer than in *Rh. ferrum-equinum*.

a. ad. sk., in al.	Manilla.	J. Gould, Esq. [P.].
b. ad. sk.	Manilla.	J. Gould, Esq. [P.].
c. ♂ imm., al.	Philippine Islands.	

(Labelled *Rhinolophus arcuatus*, Peters.)

9. Rhinolophus macrotis.

Rhinolophus macrotis (*Hodgson*), *Blyth, J. A. S. B.* xiii. p. 485; *Dobson, Monogr. Asiat. Chiropt.* p. 45, figs. *a*, *b* (1876).

Ears very large in proportion to the size of the animal, subacutely pointed; outer margin slightly concave immediately beneath the tip, then convex, separated below from the well-developed antitragus by a moderately deep notch; nose-leaf large, horseshoe portion concealing the upper lip, as in *Rh. luctus*; anterior flat surface of the central leaf broad, maintaining the same breadth from the horizontal part between the nostrils to its rounded termination above; upper edge of the posterior vertical process obtusely conical, equalling or scarcely exceeding in height the anterior process; terminal process of the posterior nose-leaf ovate, subacutely pointed.

Wing-membrane from the ankles; interfemoral membrane square or slightly triangular behind; extreme tip of tail free.

Length (of an adult ♂ preserved in alcohol), head and body 1″·7, tail 0″·8, head 0″·75, ear 0″·85 × 0″·55, antitragus 0″·25, nose-leaf 0″·5 × 0″·3, forearm 1″·6, third finger 2″·2, fifth finger 2″, thumb 0″·25, tibia 0″·7, foot 0″·35.

Hab. Himalaya (Nipal, Masuri).

The ears and nasal membranes are in this small species larger in proportion to the size of the animal than in any other species of the genus.

Type in the collection of the Indian Museum, Calcutta.

a. ♂ ad., al.	Nipal.	? B. H. Hodgson, Esq. [P.].

10. Rhinolophus megaphyllus.

Rhinolophus megaphyllus, *Gray, P. Z. S.* 1834, p. 52; *Append. to Grey's Journal of two Expeditions in Australia*, p. 405; *Gould, Mammals of Australia*, iii. pl. 33 (1853); *Peters, MB. Akad. Berl.* 1871, p. 307.

Ears equal to the head in length, subacutely pointed; the extremity of the ear not attenuated, outer margin concave for a short distance beneath the tip, then slightly convex; antitragus large, separated by a deep notch. Horseshoe-shaped membrane broad, concealing the muzzle, with a small notch in front, behind which a slightly raised narrow ridge extends backwards to the base of the sella; anterior vertical process of the sella slightly narrowed above the middle, rounded off above; summit of the connecting-process rounded, scarcely exceeding the anterior vertical process, and clothed

with a few short hairs; sides of the terminal process of the posterior leaf concave. Lower lip with three grooves. Wings from the metatarsus. Interfemoral membrane square behind or slightly convex; tail scarcely projecting.

First upper premolar in the centre of the rather wide space between the canine and second premolar, larger than in most other species of the genus, and slightly internal; second lower premolar minute, in the tooth-row.

Length (of an adult ♂), head and body 2″, tail 1″, head 0″·8, ear 0″·8, nose-leaf 0″·65 × 0″·35, forearm 1″·9, thumb 0″·3, third finger 2″·75, fourth finger 2″·35, fifth finger 2″·45, tibia 0″·8, foot 0″·35.

Hab. N.E. Australia (Peak Downs, Moreton Bay, Richmond River, Clarence River).

This species is closely allied to *Rh. affinis*, and is evidently its Australian representative. It is, however, easily distinguished by the shape of the ears, the inner margin of the ear-conch maintains its convexity from the base to the tip, which is consequently not so acute nor so clearly defined as in *Rh. affinis*, in which the terminal one sixth of the inner margin is flattened; by the greater size of the horseshoe-shaped portion of the nose-leaf, which quite conceals the muzzle and is distinctly notched in front; and by the attachment of the wing-membrane to the metatarsus instead of to the ankle as in *Rh. affinis*.

a. ad. sk. (type).	(Figured in Voy. 'Erebus' and 'Terror.')	
b. ad. sk., al.	Australia.	G. Bennett, Esq. [P.].
c. ♂ ad., al.	Peak Downs, Queensland.	Godeffroy Museum.
d. ♀ ad., al.	Gayndah, Queensland.	Godeffroy Museum.
e. ad. sk.	Moreton Bay.	Purchased.
f. ad. sk.	Clarence River, N. S. Wales.	Purchased.
g. ad. sk.	Richmond River, N. S. Wales.	

Var. *α*.

Rhinolophus truncatus, *Peters, MB. Akad. Berl.* 1871, p. 307.

Slightly smaller than specimens of *Rh. megaphyllus* from Australia, and the summit of the vertical process of the sella is truncated, not rounded off.

Length, ear 0″·7, forearm 1″·7, third finger 2″·6, fifth finger 2″·2, tibia 0″·7, foot 0″·35.

Hab. Batchian Island.

a, b, c. ad. sks.	Batchian Island.	A. R. Wallace, Esq. [C.].

Var. *β*.

About the size of the preceding, or even smaller, and the summit of the vertical process of the sella is broadly rounded off, much broader than the base, and not exceeded in height by the low rounded crest of the connecting-process. Wings from the ankles.

Hab. North Celebes; Goram Island.

a, b. ♀ ad. sks.	Menado, N. Celebes.	A. R. Wallace, Esq. [C.].
c. ad. sk.	Goram Island.	A. R. Wallace, Esq. [C.].

11. Rhinolophus affinis.

Rhinolophus affinis, *Horsfield, Zool. Researches in Java* (1824); *Temminck, Monogr. Mamm.* ii. p. 31 (1835); *Peters, MB. Akad. Berl.* 1871, p. 306; *Dobson, Monogr. Asiat. Chiropt.* p. 47 (1876).
Rhinolophus rouxii, *Temminck, l. c.* p. 30 *a* et *b*.
Rhinolophus rubidus *et* cinerascens, *Kelaart, Prodr. Faunæ Zeylanicæ*, p. 13 (1852).

Ears somewhat shorter than the head, acute, the outer margin not deeply hollowed out beneath the tip; antitragus large, separated by a deep angular incision. Horizontal horseshoe-shaped membrane moderate, not extending so far in front or laterally as to conceal the sides of the muzzle when viewed from above, yet larger than in *Rh. ferrum-equinum*; vertical front surface of the sella maintaining the same width upwards, rounded off above, exceeded in height by the summit of the laterally flattened connecting-process, which forms a rounded-off angle from which a few hairs arise; terminal nose-leaf rather short, the subacute triangular terminal process with slightly concave sides (Plate VII. fig. 5). Lower lip with three distinct grooves.

Wing-membrane from the tarsus or ankle, or from the tibia higher up. Interfemoral membrane square or slightly angular behind; tail wholly included, or projecting by the extreme tip.

Fur variable in colour, greyish brown or reddish brown or even golden orange-brown, the hairs darker towards their extremities. *Rh. cinerascens*, *fulvidus*, et *rubidus*, Kelaart, were founded on these differences in the colour of the fur.

Length, head and body 2″·3, tail 0″·9, head 0″·95, ear 0″·75, antitragus 0″·28, nose-leaf 0″·55 × 0″·35, forearm 2″·1, thumb 0″·35, third finger 3″·25, fifth finger 2″·7, tibia 0″·95, foot 0″·48.

Hab. Peninsula of India, from the Himalaya to Cape Comorin (inhabiting hill-tracts); Ceylon, Burma, Sumatra, Java, Borneo.

Type in the collection of the Museum of the E.I. Comp. at South Kensington.

a. ad. sk.	India.	Purchased.
b. ad. sk.	India.	Purchased.
c. ♀ ad., al.	Darjiling.	E. Blyth, Esq. [P.].
d. ♂ ad., al.	Nipal.	B. H. Hodgson, Esq. [P.].
e–g. ad. sks.	Ceylon.	Dr. Kelaart [P.].
h. ♀ ad., al.	Ceylon.	Purchased.
	(Labelled *Rhinolophus ceylonicus*.)	
i. ♂ ad., al.	Ceylon.	Purchased.
j, k. ♂ & ♀ ad., al.	Ceylon.	Purchased.
l. ♂ ad., al.	Ceylon.	
m. ad. sk.	Pinang.	Dr. Cantor [P.].
n. ♂ ad., al.	Sumatra.	

o, p. ad. sk.	Java.	Purchased.
q, r. ♂ & ♀ ad., al.	Borneo.	L. L. Dillwyn, Esq.
s, t. ad. sk.		Parzudaki Coll.
u, v. ♂ ad., al.		
w. ad. sk.	No history.	
x. skull.	India.	Capt. Boys.
y. skull of *w*.		
z. skeleton.	Ceylon.	

12. Rhinolophus andamanensis.

Rhinolophus andamanensis, *Dobson, Journ. Asiat. Soc. Beng.* 1872, p. 337; *Monogr. Asiat. Chiropt.* p. 46, fig. *a* (1876).

Like *Rh. affinis* generally; but the anterior horizontal horseshoe-shaped membrane is very broad, completely concealing the muzzle when viewed from above, as in *Rh. pearsonii*; the posterior terminal leaf is also much longer, produced backwards between the ears, and not concave on the sides as in *Rh. affinis*. The thumb is also much longer.

Fur bright reddish brown above and beneath.

Length (of an adult ♂, the type), head and body 2″·5, tail 0″·9, head 1″·05, ear 0″·85, nose-leaf 0″·75 × 0″·45, forearm 2″·05, thumb 0″·45, third finger 3″·2, fifth finger 2″·5, tibia 1″, foot 0″·5.

Hab. Southern Andaman Island.

Type in the collection of the Indian Museum, Calcutta.

13. Rhinolophus acuminatus.

Rhinolophus acuminatus, *Peters, MB. Akad. Berl.* 1871, p. 308; *Dobson, Monogr. Asiat. Chiropt.* p. 51 (1876).

Ears somewhat shorter than the head, acute though not attenuated at the tip; antitragus large, separated by a deep angular incision. Horizontal horseshoe-shaped nose-leaf not so broad as the muzzle; vertical part of the sella maintaining almost the same breadth upwards and rounded off above, exceeded considerably in height by the upper margin of the posterior connecting-process, produced into an acute point as in *Rh. euryale*, though not so long; posterior terminal leaf short, terminal process consisting of a short narrow projection. Lower lip with three vertical grooves.

Wings from the metatarsus almost from the base of the toes. Interfemoral membrane deeply concave behind; tail wholly contained within the membrane.

Fur dark brown above, paler beneath.

Length, head and body 2″·1, tail 0″·9, ear 0″·7, antitragus 0″·25, forearm 1″·9, thumb 0″·3, third finger 2″·7, fifth finger 2″·4, tibia 0″·8, foot 0″·4, nose-leaf 0″·5 × 0″·32.

Hab. Java.

Type in the collection of the Berlin Museum.

14. Rhinolophus petersii.

Rhinolophus petersii, *Dobson, Journ. Asiat. Soc. Beng.* 1872, p. 337; *Monogr. Asiat. Chiropt.* p. 49, figs. *a*, *b* (1876).

Ears acutely pointed, with an emargination immediately beneath the tip; antitragus large, separated from the outer margin by a deep angular incision. Nose-leaf as in *Rh. acuminatus*, except the upper border of the posterior connecting-process, which is much less acute. Lower lip with three vertical grooves.

Wings from the ankles; interfemoral membrane slightly triangular behind; extremity of the tail free, projecting abruptly one tenth of an inch beyond the membrane.

Fur dark brown above, greyish brown beneath.

Length (of an adult ♂ preserved in alcohol), head and body 2″·5, tail 1″, ear 0″·75, antitragus 0″·3, forearm 2″, thumb 0″·4, third finger 2″·8, fifth finger 2″·5, tibia 0″·9, foot 0″·5, nose-leaf 0″·55 × 0″·35.

Hab. Unknown.

Type in the collection of the Indian Museum, Calcutta.

A specimen in the collection labelled "Gold Coast, Dr. A. Smith," is apparently not distinguishable from this species. It agrees with it in external structure and differs but slightly in measurements:—Length, head and body 2″·2, tail 0″·9, ear 0″·65, forearm 1″·85, thumb 0″·3; third finger—metacarp. 1″·35, 1st ph. 0″·55, 2nd ph. 0″·85; fifth finger—metacarp. 1″·33, 1st ph. 0″·45, 2nd ph. 0″·55; tibia 0″·85, foot 0″·45, nose-leaf 0″·5 × 0″·3.

15. Rhinolophus minor.

Rhinolophus minor, *Horsfield, Zoolog. Researches in Java* (1824); *Temminck, Monogr. Mammal.* ii. p. 35 (1835–41); *Dobson, Monogr. Asiat. Chiropt.* p. 50 (1876).
Rhinolophus cornutus, *Temminck, l. c.* p. 37.
Rhinolophus borneensis, *Peters, MB. Akad. Berl.* 1861, p. 709.

Ears slightly shorter than the head, subacutely pointed, concave for a short distance beneath the tip; antitragus large, separated by a deep angular notch; horizontal nose-leaf as in *Rh. affinis*; vertical process of the sella maintaining the same width upwards, its summit rounded off, much exceeded in height by the upper margin of the posterior connecting-process, which forms an acute projection; posterior nose-leaf small, terminating in a short narrow process. Lower lip with three vertical grooves.

Wings from the ankles; interfemoral membrane square or slightly concave behind; tip of the tail scarcely projecting. Fur light brown above, greyish brown beneath.

In the type specimen the second lower premolar stands in the tooth-row, and is visible without the aid of a lens. In other specimens, which differ in no other respect from the type, I have found this tooth external to the tooth-row, as in most species of this genus,

while other specimens agree with the type in having the second lower premolar in the tooth-row. In one specimen I have observed this tooth partially external. I therefore regard this character as a variable one, in this species at least.

The upper margin of the posterior connecting-process of the sella is more acute in some specimens of this species than in others; and the form of the posterior free margin of the interfemoral membrane varies, as in *Rh. affinis*, also, from being slightly concave to square, or even to a slight angularity.

The following Table exhibits, in the first column, the measurements of the type specimen, a dried skin; in the second, those of an adult female from Burma, with the second lower premolar half external; in the third, those of an adult male, with the second lower premolar very small and quite external to the tooth-row:—

	I.	II.	III.
Length, head and body	...	1·6	1·5
„ tail	0·75	0·7	0·7
„ head	...	0·7	0·68
„ ear	0·52	0·55	0·53
„ nose-leaf	...	0·45	0·43
Breadth, nose-leaf	...	0·26	0·25
Length, forearm	1·45	1·45	1·43
„ thumb	0·2	0·2	0·2
„ third finger, metacarpal	1·0	1·0	1·05
„ „ 1st phalanx	0·4	0·42	0·42
„ „ 2nd „	0·6	0·6	0·6
„ fifth finger, metacarpal	1·05	1·0	1·05
„ „ 1st phalanx	0·35	0·35	0·35
„ „ 2nd „	0·4	0·4	0·4
„ tibia	0·6	0·6	0·6
„ foot	0·25	0·25	0·25

Hab. Peninsula of India, Yunan, Burma, Siam, Sumatra, Java, Borneo, Japan.

Rhinolophus pusillus, Temminck, is not a synonym of this species (as stated in my Monograph of the Asiatic Chiroptera), but of *Rh. hipposideros*, as I have determined by direct comparison of the types of this species and of *Rh. pusillus* in the Leyden Museum.

a. ♀ ad., al.	Malabar coast, India.	Purchased.
b. ad. sk.	India.	Purchased.
c. ad. sk.	Siam.	Purchased.
d, *e*. ♂ ad., al.		
f. ♀ ad., al.		
g. skull of *b*.		

16. Rhinolophus garoensis.

Rhinolophus garoensis, *Dobson, Journ. Asiat. Soc. Beng.* 1872, p. 337; *Monogr. Asiat. Chiropt.* p. 48, figs. *a*, *b*, *c* (1876).

Ears acutely pointed, with a large antitragus as in *Rh. affinis*. Anterior vertical process of the sella maintaining the same breadth upwards and rounded-off above, considerably exceeded in height by

the upper edge of the connecting-process, which develops a long acutely pointed projection; terminal portion of the posterior leaf broad, with straight sides, forming almost an equilateral triangle.

Wing-membrane from the ankles; interfemoral membrane square behind; extreme tip of the tail free.

The second lower premolar stands in the tooth-row, and, although much smaller than the first premolar, is not minute.

The type of this species was obtained by Major H. H. Godwin-Austen in the Garo hills; and the following measurements show it to be probably the smallest known species of the genus:—Length, head and body 1″·5, tail 0″·7, head 0″·6, ear 0″·5, antitragus 0″·2, nose-leaf 0″·4 × 0″·2, forearm 1″·3, thumb 0″·2, third finger 2″, fifth finger 1″·7, tibia 0″·6, foot 0″·3.

Hab. Garo hills, Assam; Himalaya (Masuri).

This small species is closely allied to *Rh. minor*, Horsfield, from which the broad terminal portion of the nose-leaf, not emarginate on the sides, distinguishes it.

Type in the collection of the Indian Museum, Calcutta.

17. Rhinolophus euryale.

Rhinolophus euryale, *Blasius, Archiv für Naturg.* i. p. 49; *Fauna Deutschl.* p. 35 (1855); *Peters, MB. Akad. Berl.* 1871, p. 308; *Dobson, Monogr. Asiat. Chiropt.* p. 51 (1876).

Ears acutely pointed but not attenuated at the tip; the antitragus shallow, separated from the outer margin by an obtuse angular notch, as in *Rh. ferrum-equinum*; nose-leaf small; sides of the vertical portion of the sella straight, summit rounded, considerably exceeded in height by the upper margin of the connecting leaf, which develops a long narrow acutely pointed process; posterior terminal leaf moderately long, concave on the sides towards the subacute extremity (Plate VII. figs. 6, 6 *a*).

Interfemoral membrane square behind; the extreme tip of the tail projecting. Wings from the tibiæ above the ankles.

Above dark reddish brown, beneath light brown.

Length, head and body 2″, tail 0″·9, ear 0″·8, forearm 1″·8, thumb 0″·3, third finger 2″·8, fifth finger 2″·1, tibia 0″·75, foot 0″·35, nose-leaf 0″·5 × 0″·28.

Hab. Europe (south of the Alps); Asia Minor (Syria); Northern Africa.

a, b. ♂ & ♀ ad., al.	Monti Pisan.	Marquis Doria.
c. ♀ ad., al.	Liguria.	Lord Lilford [P.].
d. ♂ ad., al.	Southern Europe.	
e. ad. sk.	Syria.	Dr. Staudinger [C.].
f. ♀ ad., al.	Lake of Galilee.	Canon Tristram [C.].
g. ♂ ad., al.	Euphrates valley.	Col. Chesney [C.].
h. ♂ ad., al.		Parzudaki Coll.
i. ♂ skeleton.	Liguria.	Lord Lilford [P.].

18. Rhinolophus blasii.

Rhinolophus clivosus, *Blasius (non Cretzschmar)*, *Fauna Deutschl.* p. 33, figs. 10, 11 (1857).
Rhinolophus blasii, *Peters*, *MB. Akad. Berl.* 1866, p. 17, and 1871, p. 309; *Dobson*, *Monogr. Asiat. Chiropt.* p. 51 (1876).

Ears shorter than the head, acutely pointed, slightly attenuated towards the tips, but much less so than in *Rh. ferrum-equinum*; antitragus separated from the outer margin by a very shallow emargination. Horizontal horseshoe-shaped membrane small, leaving the front and sides of the muzzle uncovered; vertical process of the sella short, abruptly narrowed at half its height, and terminating in a subacute point, its upper half thus presenting a triangular surface anteriorly; upper margin of the posterior connecting-process forming a long narrow acutely pointed projection, extending high above the summit of the vertical process of the sella; terminal nose-leaf moderately large, sides of the terminal triangular process slightly concave (Plate VII. fig. 7). Lower lip with a single groove. Wings from the ankles; interfemoral membrane square behind; extreme tip of tail projecting.

Fur reddish brown above, light greyish brown beneath.

Length (of an adult ♂ preserved in alcohol), head and body 1″·9, tail 1″, ear 0″·7, antitragus 0″·3, forearm 1″·8, thumb 0″·28; third finger—metacarp. 1″·15, 1st ph. 0″·55, 2nd ph. 1″; fifth finger—metacarp. 1″·25, 1st ph. 0″·4, 2nd ph. 0″·5; tibia 0″·75, foot 0″·35.

Hab. Europe (south of the Alps); Northern Africa; Asia Minor (Palestine).

Type in the collection of the Berlin Museum.

a–c. ♂ & ♀ ad., al.	Cave of Adullam, Palestine.	Canon Tristram [C.].
d. skeleton.	Cave of Adullam, Palestine.	Canon Tristram [C.].

19. Rhinolophus hipposideros.

Noctilio hipposideros, *Bechstein*, *Naturg. Deutschl.* p. 1194 (1801).
Vespertilio hippocrepis, *Hermann*, *Observ. Zoolog.* p. 18 (1804).
Rhinolophus bihastatus, *Geoffroy*, *Descript. de l'Égypte*, ii. p. 132 (1812).
Rhinolophus pusillus, *Temminck*, *Monogr. Mammal.* ii. p. 35 (1835–41)*.
Rhinolophus hipposideros, *Blasius*, *Fauna Deutschl.* 1857; *Peters*, *MB. Akad. Berl.* 1871; *Dobson*, *Monogr. Asiat. Chiropt.* p. 52 (1876).
Rhinolophus minimus, *Heuglin*, *Säugeth. N.Ost-Afrika's*, p. 6 (1861).

Ears nearly as long as the head, very acutely pointed; outer margin of the conch deeply concave beneath the tip; antitragus separated

* The types of *Rhinolophus pusillus*, Temm., in the collection of the Leyden Museum are, undoubtedly, examples of this species.

by a deep angular notch. Horizontal horseshoe-shaped nose-leaf not concealing the sides of the muzzle, finely crenate along its outer free margin; vertical process of the sella long, diminishing gradually in width from the base upwards, its anterior surface thus presenting the form of an isosceles triangle with a narrowly rounded-off vertical angle; the upper edge of the posterior connecting-process forms a narrow subacute projection, scarcely exceeding the summit of the anterior process of the sella; posterior nose-leaf long, its terminal process shaped like the vertical process of the sella (Plate VII. fig. 8). Lower lip with a single vertical groove.

Wings from the ankles; interfemoral membrane angular behind, the extreme tip of the tail alone projecting.

Fur light brown above, beneath light greyish brown.

Length (of an adult ♂ preserved in alcohol), head and body 1″·55, tail 1″·15, head 0″·65, ear 0″·6, forearm 1″·5, third finger 2″·2, fifth finger 2″, tibia 0″·7, foot 0″·3, nose-leaf 0″·5 × 0″·3.

Hab. Palæarctic Region; Southern and Middle Europe (Dalmatia, Italy, Southern Russia, Hungary, Switzerland, Germany, France, Southern England, Ireland); N.E. Africa; Asia Minor (Caucasus range); and, if the "habitat" Java given by Temminck for *Rh. pusillus* be correct, extending also into, and perhaps throughout, the Oriental Region.

a. ♀ ad., al.	Devonshire.	Mus. Leach.
b, c. ♂ & ♀ ad., al.	Schlangenbad.	Dr. Günther [P.].
d. ad. sk.	St. Gothard.	
e–g. ♂ & ♀ ad., al.	Sicily.	Purchased.
h. ad. sk.	St. Maura.	M. O. Galliard [P.].
i. ♀ ad., al.	Tangiers.	Mr. Fraser's Collection.
j. ♀ ad., al.		Purchased.
k, l. ♀ ad., al.	No history.	
m, n. ♂ ad., al.	No history.	
o. ♀ ad., al.		Zool. Soc. Coll.
p, q. skulls.	England.	Mr. Yarrell's Collection.
r. skull.	Schlangenbad.	Dr. Günther [P.].
s. skull of *d*.		
t–v. skulls.	No locality.	Old Collection.

20. Rhinolophus landeri.

Rhinolophus landeri, *Martin, P. Z. S.* 1837, p. 101; *Peters, MB. Akad. Berl.* 1871, p. 308.

Ears shorter than the head, not attenuated at their extremities, the inner margin of the ear-conch convex to the tip; antitragus short, evenly convex, separated posteriorly by a very shallow notch; nose-leaf about the same size as in *Rh. affinis*, the horizontal leaf broader than in *Rh. euryale*, but not concealing the muzzle; vertical process of the sella slightly narrowed in the centre, broader and rounded-off above, exceeded in height by the upper margin of the posterior connecting-process, which forms an angular elevation more or less acute,

but much broader at its base and much shorter than in *Rh. euryale*; posterior leaf rather short and acutely pointed (Plate VII. fig. 9).

Wings from the ankles or from the tibia close to the ankle-joint. Interfemoral membrane short, slightly triangular behind.

Fur varying from deep ferruginous brown, above and beneath, to sulphur or pale yellowish brown.

The first upper premolar blunt, in the tooth-row, but closely appressed between the canine and second premolar.

Length (of the type specimen), head and body 1″·6, tail 0″·85, ear 0″·65, nose-leaf 0″·45 × 0″·28, forearm 1″·7, thumb 0″·28; third finger—metacarp. 1″·15, 1st ph. 0″·5, 2nd ph. 0″·9; fifth finger—metacarp. 1″·2, 1st ph. 0″·3, 2nd ph. 0″·55; tibia 0″·65, foot 0″·3.

Hab. Africa (Fernando-Po Island, Gaboon, Damara Land).

a.	♀ ad., al. (type).	Fernando Po.	Zool. Soc. Coll.
b.	♀ ad., al.	Elloby district, Gaboon.	H. A. Ansell, Esq.
c.	♀ ad., al.		Dr. Livingstone [C.].

21. Rhinolophus ferrum-equinum.

Vespertilio ferrum-equinum, *Schreb. Säugeth.* i. p. 174 (1775); *Erxleb. Syst. Reg. Anim.* p. 154 (1777); *Gm. Lin.* p. 50 (1788).
Rhinolophus unihastatus, *Geoffroy, Ann. du Muséum*, xx. p. 257.
Rhinolophus geoffroyi, *Smith, Zool. Journ.* iv. p. 433.
Rhinolophus ferrum-equinum, *Leach, Zool. Miscell.* iii. p. 2; *Jenyns, Brit. Verteb.* p. 19; *Bell, British Quadrup.* p. 68 (wdct.) (1837); *Blasius, Fauna Deutsch.* p. 31 (1857); *Peters, MB. Akad. Berl.* 1871, p. 310; *Dobson, P. A. S. B.* 1872, p. 208; *Monogr. Asiat. Chiropt.* p. 53 (1876).
Rhinolophus nippon, *Temm. Monogr. Mammal.* ii. p. 30 *a* (1835–41).
Rhinolophus tragatus, *Hodgson, J. A. S. B.* iv. p. 699.
Rhinolophus fumigatus, *Rüppell, Mus. Senckenberg.* iii. p. 132 (*vide Peters, l. c.* 1871, p. 311); *Peters, C. v. der Decken Reis. in Africa, Säugeth.* pl. 2. fig. 3.
Rhinolophus deckenii, *Peters, MB. Akad. Berl.* 1867, p. 705.

Ears slightly shorter than the head, very acutely pointed and attenuated towards the tip, the outer margin of the ear-conch deeply concave in its upper third, the inner margin slightly concave in its upper fourth; antitragus not much developed, separated posteriorly by a shallow obtuse-angled notch. Nose-leaf rather small, the horseshoe-shaped portion not concealing the sides of the muzzle; vertical process of the sella narrow, concave on the sides, rounded-off above, the summit as broad as the base, narrowest in the centre, exceeded considerably in height behind by the superior margin of the posterior connecting-process, which, viewed laterally, is obtusely conical, and is clothed with a few fine straight hairs; triangular terminal portion of the posterior leaf emarginate on the sides towards the apex, forming a narrow acutely pointed process (Plate VII. fig. 10).

Wings from the ankles; interfemoral membrane slightly triangular behind; tip of the tail free; calcanea well developed.

Fur, above, reddish brown with a greyish tinge; beneath pale grey, almost white.

Second upper premolar close to the canine; first premolar minute and quite external to the tooth-row; second lower premolar not discernible in some specimens, in others always detected with difficulty, even with the aid of a lens, lying in the outer angle between the closely approximated first and third premolars.

Length, head and body 2″·35, tail 1″·55, head 1″, ear 0″·9, noseleaf 0″·6 × 0″·35, forearm 2″·25, thumb 0″·32; third finger—metacarp. 1″·55, 1st ph. 0″·75, 2nd ph. 1″·35; fourth finger—metacarp. 1″·6, 1st ph. 0″·45, 2nd ph. 0″·8; fifth finger—metacarp. 1″·65, 1st ph. 0″·55, 2nd ph. 0″·7; tibia 0″·9, foot 0″·55.

Hab. Europe, Africa, Asia. In Europe extending as far north as Southern England, and the Harz Mountains in Germany; in Africa probably generally distributed; in Asia found in the Himalaya and in Japan. It has therefore by far the widest distribution of any species of the genus. In tropical countries it appears to be more or less confined to the elevated tablelands.

Rh. ferrum-equinum is easily distinguished by the peculiarly attenuated and very acutely pointed extremities of the ears, by the form of the erect process of the sella, which is slightly expanded above and beneath, and by the position of the first upper premolar outside the tooth-row. The length of the ear varies slightly.

a. ♂ ad., al.	Tübingen.	Dr. Günther [P.].
b. ♀ ad., al.	Turin.	
c, d. ♂ ad., al.	Sicily.	Purchased.
e. ad. sk.	Europe.	Leyden Museum.
f, g. ad. sks.	Syria.	
h, i. ♀ ad., al.	Lake of Galilee.	Canon Tristram [C.].
j–l. ♀ ad., al.	Euphrates valley.	Col. Chesney [C.].
m–o. ♂ & ♀ ad., al.	Nipal.	B. H. Hodgson, Esq. [P.].
p. ♀ ad., al.	Darjiling, India.	
q. ad. sk.	India.	Capt. Boys.
r, s. ♀ ad., al.	Shanghai.	R. Swinhoe, Esq. [P.].
t. ad. sk.	Japan.	
u. ♀ ad., al.	Gaboon.	Purchased.
v. ♂ ad., al.	Port Natal.	Rev. H. Callaway [P.].
w. ♂ imm., al.	King William's Town.	Lieut. Trevelyan [P.].
x. ad. sk.	Cape of Good Hope.	
y. ♀ ad., al.		Haslar Collection.
z. ♂ ad., al.	No history.	
a′, b′. ad., sk.		
c′–p′. skulls.	Nipal.	B. H. Hodgson, Esq. [P.].
	(Labelled *Rhinolophus tragatus*, Hodgs.)	
q′. skull of *o*.		
r′. skull of *a′*.		

22. Rhinolophus clivosus.

Rhinolophus clivosus, *Rüppell, Atlas, Reise nord-ost Afrika*, p. 47 (1824); *Peters, MB. Akad. Berl.* 1866, p. 16, 1871, p. 311.

Ears considerably shorter than the head, acutely pointed; inner margin of the ear-conch convex throughout, but less convex above,

tip not attenuated; antitragus separated by an obtuse notch, short, evenly convex; nose-leaf not concealing the muzzle, divided by a simple notch in front; horizontal plate of the sella with semicircular sides much broader than the vertical process, which is slightly narrower in the middle and similar to that in *Rh. ferrum-equinum*, its summit rounded-off above, considerably surpassed in height by the crest of the connecting-process, which forms an acute thickened projection; terminal leaf rather short and acute; horseshoe-shaped nose-leaf not concealing the sides of the muzzle.

Wings from the tibiæ slightly above the ankles; last small caudal vertebræ projecting.

Fur sulphur-brown above, beneath canary-colour.

First upper premolar in the tooth-row in immature specimens; in adults closely wedged in between the adjoining teeth.

Length (of an adult ♀), head and body 1″·75, tail 0″·95, head 0″·8, ear 0″·65, nose-leaf 0″·45 × 0″·28, forearm 1″·75, thumb 0″·3; third finger—metacarp. 1″·2, 1st ph. 0″·55, 2nd ph. 1″; fourth finger—metacarp. 1″·3, 1st ph. 0″·28, 2nd ph. 0″·65; fifth finger—metacarp. 1″·25, 1st ph. 0″·38, 2nd ph. 0″·55; tibia 0″·7, foot 0″·4.

Hab. N.E. Africa (Kordofan).

This species is very closely allied to *Rh. landeri* and to *Rh. ferrum-equinum*. It is distinguished from the former by the form of the upper margin of the posterior connecting-process of the sella, by the smaller size of the horseshoe-shaped membrane, and by its larger feet; from the latter by the form of the ears and of the upper margin of the same connecting-process, by the position of the first upper premolar in the tooth-row, and by its conspicuously smaller size.

a. ♂ & ♀ imm., al.	Kordofan.	Dr. Rüppell [C.].
b. ♀ ad., al.	? Europe.	Dr. Heckel [P.].
c. ad. sk.	North Africa.	Frankfort Museum.

23. Rhinolophus capensis.

Rhinolophus capensis, *Lichtenstein, Verz. Zool. Mus. Berl.* p. 4 (1823) *Keys. & Blas. Wiegm. Archiv*, v. p. 328 (1839); *Peters, MB. Akad. Berl.* 1871, p. 310.
Rhinolophus geoffroyii, *Smith, Zool. Journ.* ii. p. 433 (1829).
Rhinolophus clivosus, *Smith* (*non Rüppell*), *African Zoology*, part i. *Mammalia*, p. 23 (1834).
Rhinolophus auritus, *Victorin, Sundevall, Vetensk. Akad. Handl. Stockholm*, p. 13 (1858) (*vide Peters, l. c.*).

Ears as long as the head, broad, subacutely pointed, not attenuated near the tips as in *Rh. ferrum-equinum*; the inner margin of the ear-conch convex in its upper third, the outer margin concave for a short distance immediately beneath the tip, then convex; the antitragus separated by a very shallow notch; horizontal horseshoe-shaped membrane not concealing the muzzle though covering it anteriorly, the remaining parts of the nose-leaf similar to those in *Rh. ferrum-equinum* (Plate VII. fig. 11).

Interfemoral membrane short, straight along free margin; tip of the tail very slightly projecting. Wing-membrane from the tarsus.

Fur as in *Rh. ferrum-equinum*.

First upper premolar minute, in the very narrow space between the canine and second premolar, half external.

Length (of an adult ♀ preserved in alcohol), head and body 2″·15, tail 0″·85, head 0″·9, ear 0″·9, nose-leaf 0″·55 × 0″·3, forearm 1″·9, thumb 0″·3; third finger—metacarp. 1″·3, 1st ph. 0″·65, 2nd ph. 1″·1; fourth finger—metacarp. 1″·5, 1st ph. 0″·35, 2nd ph. 0″·65; fifth finger—metacarp. 1″·45, 1st ph. 0″·45, 2nd ph. 0″·55; tibia 0″·75, foot 0″·45.

Hab. South Africa (Zanzibar, Cape Colony).

This species resembles *Rh. ferrum-equinum* very closely in the form of its nose-leaf, but may be at once distinguished by the very different form of the ears, and by the position of the first minute upper premolar.

a, *b*, *c*. ♀ ad., al.	Zanzibar.	Dr. Kirk [P.].
d–*n*. ♂ & ♀ ad., al.	Cape Town.	Trustees S. African Mus. [P.].
o, *p*. ad. sk.	Cape of Good Hope.	
q. skull of *c*.		
r. skeleton.	Cape Town.	Trustees S. African Mus. [P.].

24. Rhinolophus æthiops.

Rhinolophus æthiops, *Peters, MB. Akad. Berl.* 1868, p. 637.

Resembles *Rh. ferrum-equinum* closely in size and in the general form of the ears; the ear-conch, however, is less attenuated above and quite obtusely pointed, and the nasal cutaneous appendages are much larger; horseshoe-shaped portion of the nose-leaf broad, concealing the muzzle laterally and in front when viewed from above; central erect part of the sella as in *Rh. ferrum-equinum*, but the posterior connecting band is more broadly rounded off above and scarcely rises above the level of the extremity of the sella; sides of the terminal lancet-shaped leaf straight, not emarginate (Plate VII. fig. 12); lower lip divided by a single vertical groove.

Wings from the ankles or tarsi; interfemoral membrane straight behind, between the extremities of the extended calcanea; last caudal vertebra projecting.

Colour and distribution of the fur and dentition as in *Rh. ferrum-equinum*.

Length, head and body 2″·4, tail 1″·2, head 0″·95, ear 0″·9, nose-leaf 0″·65 × 0″·4, forearm 2″·2, thumb 0″·3; third finger—metacarp. 1″·5, 1st ph. 0″·65, 2nd ph. 1″·3; fourth finger—metacarp. 1″·55, 1st ph. 0″·4, 2nd ph. 0″·8; fifth finger—metacarp. 1″·55, 1st ph. 0″·5, 2nd ph. 0″·55; tibia 0″·9, foot 0″·5.

Hab. West Africa (Benguela, Otjimbingue).

a. ♀ ad., al.	Benguela, Angola.	Dr. J. E. Gray [P.].
b. ♂ ad., al.	Benguela, Angola.	Dr. J. E. Gray [P.].
c, *d*. ad., al.	Benguela, Angola.	Dr. J. E. Gray [P.].
e. ♀ imm., al.	Benguela, Angola.	F. F. Monteiro [P.].

Subfam. II. PHYLLORHININÆ.

Toes equal, of two phalanges each; ilio-pectineal spine united by a bony isthmus with a process derived from the antero-inferior surface of the ilium, forming a large preacetabular foramen *.

Synopsis of Genera.

a. Horizontal anterior nose-leaf horseshoe-shaped; metacarpal bone of index finger equal to or scarcely exceeding the metacarpal of the third finger in length.
  a''. Centre of the upper surface of the horseshoe supporting the base of a horizontal crest extending backwards between and above the nasal apertures.
    a'''. Outer margin of the ear commencing near the posterior commissure of the eyelids.... 2. TRIÆNOPS, p. 123.
    b'''. Outer margin of the ear commencing at a point distant from and on a much lower level than the eye ..... 3. RHINONYCTERIS, p. 126.
  b''. Centre of the upper surface of the horseshoe uncovered; no horizontal crest extending backwards between and above the nasal apertures ..... 4. PHYLLORHINA, p. 127.
b. Horizontal anterior nose-leaf lobate; metacarpal bone of the index finger very long, extending to the first phalanx of the middle finger..... 5. COELOPS, p. 152.

2. TRIÆNOPS.

Triænops, *Dobson, Journ. Asiat. Soc. Beng.* xl. (1871) p. 455.

Nose-leaf horseshoe-shaped in front, tridentate behind; horseshoe-shaped portion consisting of two laminæ, of which the overlying one

* The bridge thus formed between the spinous process of the *eminentia ilio-pectinea* and the antero-inferior spine of the ilium forms the inferior boundary of a large foramen, larger than the obturator opening, which lies behind and in a plane slightly inferior to it. This foramen occurs only in the species of Bats included in this subfamily, and has not yet been observed in any other species of mammal. The osseous connecting arch forming its inferior boundary evidently greatly strengthens the pelvis (which is so remarkably weak in all Bats); but we do not yet know whether there be any corresponding difference in the habits of the animals possessing this peculiar structure which may require additional strength in the pelvis.

The Bats of this subfamily are also remarkably characterized by the equal

is deeply emarginate in front, with the sides of the emargination turned upwards and supporting the base of a longitudinal horizontal crest, extending backwards between and above the nasal apertures; hinder erect portion of the nose-leaf with one cell in the centre of its base, the entrance to which is guarded by a lanceolate process, with cells on the sides of its front surface, and one on each side behind immediately above the eye. Ears without a distinct antitragus, as in *Phyllorhina*, the outer margin of the ear-conch arising from the posterior commissure of the eyelids.

Dentition. Inc. $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

First upper premolar minute.

1. Trisænops persicus.

Trisænops persicus, *Dobson, Journ. Asiat. Soc. Beng.* xl. p. 455, pl. xxviii.; *id.* "*On the Osteology of,*" *l. c.* xli. 1872, pp. 136–142, pl. vi. figs. 1–14; *id. Monograph Asiat. Chiropt.* p. 56, fig. *a* (head), fig. *b* (wing).

Head long; muzzle broad, obtuse, flattened laterally; ears nearly as broad as long, funnel-shaped, with acutely pointed tips; the outer margin commences in a narrow fold of skin arising from the posterior angle of the eyelids, which, passing backwards and slightly downwards for about 0·1 inch, rises abruptly to a height of 0·2 inch, forming the outer side of the external ear; the inner margin is convex forwards, and rises to about the same height; at a short distance behind it is interrupted by a sudden emargination, which is succeeded by a triangular elevation of the rim of the ear, forming the tip, which projects outwards owing to the concavity of the outer side of this triangle.

The nasal appendages are very complicated, and difficult to describe. Their form will be better understood by an examination of Plate VIII. fig. 1, in which the very peculiar shape of the ear is also well shown.

The terminal phalanx of the fourth finger presents a remarkable form, which has not been noticed in any other species of Bat. From the outer side of the proximal extremity of that bone a small process arises, with an inclination forwards and outwards, and terminates by an obtuse point in the wing-membrane, in which it is included (see fig. *b* in Monogr. Asiat. Chiropt., referred to above). The distal extremity of the same phalanx is very shortly bifid, as in most Rhinolophine Bats; but the terminal phalanx of the fifth finger ends in a single point.

Wing-membrane attached to the tibia a short distance above the

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number of phalanges in the toes, differing in this respect from all other species of Chiroptera except the very remarkable *Thyroptera tricolor*, a Bat possessing peculiar accessory clinging organs—suctorial disks attached to the thumbs and feet.

ankle; feet long, slender; toes equal in length, armed with long and strong claws; tail included in the interfemoral membrane, the extreme tip alone free.

On the upper surface the fur is very pale buff, almost white, with light sepia tips, darkest on the back of the neck, along the anterior margin of the scapulæ, and between the shoulders; towards the root of the tail of a yellowish tinge throughout; beneath, wholly very pale buff or dirty yellowish white, cutaneous system of the same colour. The fur is everywhere long and dense; in front it covers the posterior surface of the hinder nose-leaf, exceeding in length the height of the trident-shaped crest. Behind, the fur of the back extends on to the base of the interfemoral membrane nearly as far as the end of the second caudal vertebra; on the wing-membrane its extent is very limited; beneath, the wing-membrane is covered with hair nearly as far as a line drawn from the middle of the humerus to the middle of the femur, but the humerus and femur are completely naked beyond the body; the distribution of fur on the under surface of the interfemoral membrane is similar to that above.

The anterior upper premolar is minute with a flattened crown, and is placed outside the line of teeth; the upper and lower incisors are bilobed; the upper canines have large cusps at their bases posteriorly.

Length, head and body 2″·25, tail 1″·2, head 0″·85, ear 0″·45, forearm 2″, thumb 0″·28, second finger 1″·65; third finger—metacarp. 1″·6, 1st ph. 0″·5, 2nd ph. 0″·7; fourth finger—metacarp. 1″·45, 1st ph. 0″·4, 2nd ph. 0″·35; fifth finger—metacarp. 1″·1, 1st ph. 0″·55, 2nd ph. 0″·4; tibia 0″·65, calcaneum 0″·45, foot 0″·35.

Hab. Shiraz, Persia, at an elevation of about 4750 feet.

a. ♀ ad., al. Shiraz, Persia. Indian Museum, Calcutta [E.].

2. Triænops afer.

Triænops afer, *Peters, MB. Akad. Berl.* 1876, p. 913, fig. 2 (head).

Resembles *T. persicus* closely in general structure and in size, but distinguished by the form of the inner margin of the ear-conch and of the lanceolate process in the centre of the nose-leaf, also by the darker colour of the fur. In *T. persicus* the inner margin of the ear-conch is abruptly emarginate about the middle, and the angle thus formed is obtuse; in this species the inner margin is also abruptly emarginate, but the angle formed at the commencement of the emargination is deeply right-angled; the central lanceolate process of the nose-leaf, which in *T. persicus* is unicuspidate and very acutely pointed, in *T. afer* is bifid, and terminates in two projections, whereof the anterior is shorter.

The terminal phalanx of the fourth finger develops a bony process similar to that in *T. persicus*.

Hab. East Africa (Mombaça).

Type in the collection of the Berlin Museum.

3. RHINONYCTERIS.

Rhinonicteris, *Gray*, *P. Z. S.* 1847, p. 16.
Rhinonycteris, *Gray*, *P. Z. S.* 1866, p. 81.

Nose-leaf horseshoe-shaped in front, the horizontal membrane consisting of two laminæ, whereof the overlying one is deeply emarginate in front, the sides of the emargination bent up, and supporting (as in *Triænops*) the anterior portion of a small flat horizontal longitudinal process, which ends behind and between the deeply sunken nasal orifices; from the centre of the base of the horseshoe behind the nostrils a pointed process projects forwards, behind it is the opening of a deep central cell, which is bounded on each side by a longitudinal cell, beyond which and above the eye are two smaller cells; immediately behind the central cell is the longitudinal opening of a depression, which is evidently homologous with the frontal sac of many species of the genus *Phyllorhina*.

Ears separate, without a distinct antitragus; the outer margin of the ear-conch arising behind and below the eye. No process from the proximal extremity of the second phalanx of the third finger; toes equal, each of two phalanges.

Dentition. Inc. $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

This genus is evidently intermediate between *Triænops* and *Phyllorhina*, though it agrees more closely with the former than with the latter.

1. Rhinonycteris aurantia.

Rhinolophus aurantius, *Gray*, *Eyre's Central Australia*, i. p. 405, pl. 1. fig. 1 (1845); *Gould*, *Mammals of Australia*, iii. pl. 35.
Rhinonicteris aurantius, *Gray*, *P. Z. S.* 1847, p. 16.
Rhinonycteris aurantius, *Gray*, *P. Z. S.* 1866, p. 81.
Phyllorhina aurantia, *Peters*, *MB. Akad. Berlin*, 1871, p. 313.

Head long; muzzle thick, obtuse, flattened laterally; ears shorter than the head, with acutely pointed tips; the outer margin of the conch commences at a short distance behind and below the eye, is convex in lower half, and straight beneath the tip, which does not project outwards, inner margin regularly convex, slightly flattened near the tip. Nose-leaf broad, overhanging the muzzle, the sides of the horseshoe with a slight notch, succeeded by a small rounded projection in the centre of each side. From the centre of the base of the horseshoe a small subacutely pointed process, about one tenth of an inch long, projects forwards and upwards; behind the central cell the frontal glandular sac is bounded by walls of very thick integument, covered with hairs (Plate VIII. fig. 2).

Front margins of the upper and lower lips fringed with small warts. No pubic appendages in females, as in *Rhinolophus*.

Wings from the distal extremity of the tibia or from the ankles; toes equal, each of two phalanges; calcanea feeble, interfemoral shortly triangular behind, the extreme tip of the tail projecting.

Fur, above and beneath, bright golden yellow.

Lower incisors trifid, placed transverse to the direction of the jaws. Upper canines with a small but very distinct posterior cusp; first upper premolar extremely small, not raised above the level of the gum, and scarcely visible without the aid of a lens, in the outer angle between the closely approximated canine and second premolar.

Length (of an adult ♀), head and body 1″·85, tail 1″·1, ear 0″·55 × 0″·35, nose-leaf 0″·35 × 0″·3; third finger—metacarp. 1″·4, 1st ph. 0″·5, 2nd ph. 0″·6; fourth finger—metacarp. 1″·25, 1st ph. 0″·4, 2nd ph. 0″·3; fifth finger—metacarp. 1″·05, 1st ph. 0″·5, 2nd ph. 0″·35; tibia 0″·6, foot 0″·3.

Hab. Australia (Port Essington, Victoria).

a. ad. ♂, al. (type).	Port Essington.	Earl of Derby [P.].
b. ad. ♀, al.	North Australia.	N.-Australian Expedition.
c, *d*. ad. sks.	Victoria.	Earl of Derby [P.].

4. PHYLLORHINA.

Phyllorrhina, *Bonaparte, Saggio di una distrib. anim. vertebr.* 1831, p. 16; *Peters, MB. Akad. Berl.* 1871, p. 312; *Dobson, J. A. S. B.* 1872, p. 141; *Monogr. Asiat. Chiropt.* p. 58 (1876).
Hipposiderus, *Gray, Proc. Zool. Soc.* 1834, p. 53.
Hipposideros *et* Asellia, *Gray, Mag. Zool. & Bot.* ii. (1838), pp. 492–3.
Macronycteris, Gloionycteris, Rhinophylla, Speorifera, Chrysonycteris, Phyllorhina *et* Asellia, *Gray, P. Z. S.* 1866, pp. 81, 82.

Nose-leaf complicated, consisting of three portions, anterior, posterior, and intermediate; the anterior horseshoe-shaped, as in *Rhinolophus*, though not similarly emarginate in front; the posterior erect, with a convex, lobed, or incised free edge, concave in front, the concavity simple or divided by narrow vertical ridges into shallow cells; the intermediate portion (evidently homologous with the sella in *Rhinolophus*), forming the posterior boundary of the depression at the bottom of which the nasal orifices are placed, is usually broadly cordiform with the base upwards, the sides thickened, the centre with or without a projecting point or narrow longitudinal ridge in front.

These are the characters of the nasal appendages in by far the greater number of the species of this genus, which is also distinguished from *Rhinolophus* by the form of the ear-conch, by the absence of the large leaf-like antitragus, and, more particularly, by the presence of two joints only in all the toes, by the number and character of the teeth, and by the much greater width of the base of the skull between the auditory bullæ.

Many species are provided with a peculiar frontal sac behind the nose-leaf, which the animal can evert at pleasure like the finger of a glove; the sides of this sac secrete a waxy substance like that contained in the gular pouches of *Taphozous*; its extremity supports a pencil of straight hairs, of which the ends only project when the sac is inverted.

Dentition. Inc. $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$ *, m. $\frac{3-3}{3-3}$.

* Pm. $\frac{1-1}{2-2}$ in *Ph. tridens* and in *Ph. megalotis*.

First upper premolar minute, blunt, in the outer angle between the canine and second premolar, rarely deciduous.

Range. Tropical and subtropical regions of Asia, Malayana, Australia, and Africa.

The species of this genus are, unlike *Rhinolophus*, inhabitants of the plains and low hill-ranges of the warmer regions of the continents and islands of the eastern hemisphere lying within the tropical and subtropical zones. The largest Asiatic species, *Phyllorhina armigera*, Hodgs., appears to be the most northerly, having been obtained by Mr. Swinhoe at Amoy, in China, and by the late Captain T. Hutton at Mussooree, in the Himalaya, at an elevation of 5500 feet; *P. bicolor* is also said to have been taken by Capt. Hutton at the same elevation; but these are exceptions among the great number of species of this genus.

Synopsis of the Species.

I. Upper margin of the terminal erect portion of the nose-leaf tridentate; no frontal glandular sac. (Subgen. *Asellia*, Gray).
  a. Processes of the terminal nose-leaf thickened; extremity of the tail projecting considerably.
    1. Premolars $\frac{1-1}{2-2}$ (in adults); ears broad; forearm 1″·75 ..... *Ph. tridens*, p. 131.
    2. Premolars $\frac{2-2}{2-2}$; ears narrow; forearm 1″·6..... *Ph. tricuspidata*, p. 131.
  b. Processes of the terminal erect nose-leaf not thickened; extremity of the tail projecting slightly.
    3. Premolars $\frac{2-2}{2-2}$; ears broad; forearm 1″·5 *Ph. stoliczkana*, p. 132.

II. Upper margin of the terminal erect nose-leaf undivided; with or without a frontal sac. (Subgen. *Phyllorhina*.)
  a. Ears separate; premolars $\frac{2-2}{2-2}$.
    a'. With secondary cutaneous leaflets on the sides of the muzzle external to the horseshoe.
      a''. With a large frontal glandular sac opening *longitudinally* behind the nose-leaf; ears narrow, attenuated upwards; interfemoral membrane short.
        4. Terminal erect nose-leaf with a central club-shaped process, and a similar process from the centre of the sella beneath; forearm 2″·45 . *Ph. cyclops*, p. 134.
        5. No processes from the nose-leaf; forearm 4″·45..... *Ph. commersonii*, p. 133.
      b''. Frontal glandular sac opening transversely or none; ears broad, not attenuated above; interfemoral membrane well developed.

c'''. Terminal erect leaf narrower than the horseshoe.
c⁴. Frontal glandular sac well developed.
6. Upper margin of the erect leaf sinuate, front surface with three prominent vertical ridges; forearm 3''·8 ..... *Ph. armigera*, p. 135.
7. Upper margin of the erect leaf convex or straight, vertical ridges in front not well defined; forearm 2''·45 ..... *Ph. leptophylla*, p. 136.
d'''. The terminal erect leaf wider than the horseshoe.
d⁴. No frontal sac.
a. Front concave surface of the terminal erect leaf divided by one or more vertical ridges.
a'. With three secondary leaflets external to the horseshoe.
8. Wings from the ankles; forearm 3''·4 ..... *Ph. diadema*, p. 137.
9. Wings from the metatarsus; forearm 2''·6 ..... *Ph. nicobarensis*, p. 138.
β'. With two secondary leaflets external to the horseshoe.
10. Wings from the tarsus: forearm 1''·45 ..... *Ph. pygmæa*, p. 139.
β. Front concave surface of the terminal leaf not divided by vertical ridges.
β'. With two secondary leaflets external to the horseshoe.
11. Wings from the ankles: forearm 1''·95 ..... *Ph. fuliginosa*, p. 139.
e⁴. Frontal sac distinct in males.
β. Front concave surface of the terminal leaf not divided by vertical ridges.
β'. With two secondary leaflets external to the horseshoe.
12. Wings from the tarsus: forearm 1''·85 ..... *Ph. caffra*, p. 140.
γ. Front concave surface of the terminal leaf divided by three more or less distinct vertical ridges.
γ'. With two secondary leaflets external to the horseshoe; thumb and foot very small.
γ''. Wings from the tarsus or metatarsus.
13. Horseshoe as wide in front as in the middle; forearm 1''·75; calcaneum 0''·3 ..... *Ph. galerita*, p. 141.

14. Horseshoe much narrower in front than behind; forearm 1″·75; calcaneum 0″·45 .... *Ph. cervina*, p. 142.

δ'. With three secondary leaflets external to the horseshoe; thumb and foot moderately large.

15. Ears much shorter than the head; lower third of the outer margin of the ear-conch with an acute spine-like projection; last osseous caudal vertebra projecting abruptly; forearm 2″ ..... *Ph. speoris*, p. 143.

16. Ears nearly as long as the head; no spine-like projection from the margin of the ear-conch; tail almost wholly contained within the wing-membrane; forearm 2″·45 .. *Ph. larvata*, p. 145.

b'. No secondary cutaneous leaflets on the sides of the muzzle external to the horseshoe.

b''. Frontal glandular sac distinct in males, opening transversely.

δ. Front concave surface of the terminal erect leaf not divided by vertical ridges.

δ'. Upper margin of the erect noseleaf thin.

17. Ears as long as the head; ear-conch with a spine-like projection, as in *Ph. speoris*; forearm 1″·8..... *Ph. obscura*, p. 146.

18. Ears shorter than the head; no spine-like projection from the margin of the ear-conch; forearm 1″·3..... *Ph. doriæ*, p. 146.

ε'. Upper margin of the erect noseleaf thickened, as in *Ph. diadema*.

19. Ears shorter than the head, rounded off above; forearm 1″·8..... *Ph. coronata*, p. 147.

ε. Front concave surface of the erect leaf divided by three more or less distinct vertical ridges.

20. Ears triangular, obtusely pointed; calcaneum much longer than the foot; forearm 2″ ..... *Ph. calcarata*, p. 147.

21. Ears ovate, broadly rounded off above; calcaneum not longer than the foot; forearm 1″·55 ..... *Ph. bicolor*, p. 148.

b. Ears united by a low band; premolars $\frac{1-1}{2-2}$.

22. Ears ovate (as in *Ph. bicolor*, var. *fulva*); calcaneum shorter than the foot; forearm 1″·4..... *Ph. megalotis*, p. 151.

1. Phyllorhina tridens.

Rhinolophus tridens, *Geoffroy, Descr. de l'Egypte*, ii. p. 130 (1812).
Asellia tridens, *Gray, P. Z. S.* 1866, p. 82.
Phyllorhina tridens, *Peters, MB. Akad. Berl.* 1871, p. 314.

Ears nearly as long as the head, subacutely pointed; lower two thirds of the inner and outer margins of the ear-conch almost equally convex, the outer margin concave immediately beneath the tip, the remaining part convex; upper margin of the transverse erect nose-leaf divided into three thickened projections, the concave front surface beneath divided by three longitudinal bands; sella cordate, prominent; horseshoe-shaped membrane circular and raised in front, not divided; two secondary leaves on the sides of the muzzle parallel to the horseshoe (Plate VIII. fig. 3).

Wings from the lower third of the tibiæ; interfemoral membrane short, square behind; the last osseous caudal vertebra and half the antepenultimate vertebra free.

Fur, above, pale yellowish white with brown extremities; beneath, wholly yellowish white or pure white.

The first minute upper premolar deciduous.

Length, head and body 2″, tail 0″·75, head 0″·7, ear 0″·65 × 0″·5, forearm 1″·75, thumb 0″·3; third finger—metacarp. 1″·15, 1st ph. 0″·5, 2nd ph. 0″·6; fifth finger—metacarp. 0″·9, 1st ph. 0″·4, 2nd ph. 0″·3; tibia 0″·65, foot 0″·35.

Hab. Africa (Egypt, Zanzibar).

a–c. ad. sk.	Egypt.	Dr. Turnbull Christie [P.].
d–f. ♂ ad., al.	Egypt.	Mr. Lefevre [P.].
g. ♀ ad., al.	Egypt.	A. Christy, Esq. [P.].
h–o. ♂ ad., al.	Egypt.	Rev. O. P. Cambridge [P.].
p. ♂ ad., al.	Thebes.	W. H. Flower, Esq. [P.].
q. ad. sk.	Egypt.	
r, s. ♀ ad., al.	Egypt.	— Burton, Esq. [P.].
t, u. ♂ & ♀ ad., al.	Africa.	
v. ♂ ad., al.		— Burton, Esq. [P.].
w. ad., al.	(No history.)	
x. ad. sk.	Upper Nile region.	
y. ad. sk.	Assuan.	
z. ad. sk.		Parzudaki Coll.
a′–d′. skulls.	Egypt.	Dr. T. Christie [P.].
e′. skeleton.	Thebes.	W. H. Flower, Esq. [P.].
f′. skull of *x*.		

2. Phyllorhina tricuspidata.

Rhinolophus tricuspidatus, *Temminck, Monogr. Mammal.* ii. p. 20, pl. xxix. fig. 4, pl. xxxii. figs. 11 & 12.
Phyllorhina tricuspidata, *Peters, MB. Akad. Berl.* 1871, p. 314; *Dobson, Monogr. Asiat. Chiropt.* p. 59 (1876).

Ears shorter than the head, narrow and subacutely pointed: more than half the outer margin of the ear-conch is deeply but not abruptly concave beneath the tip, inner margin almost straight in lower two thirds, convex in upper third; upper margin of the transverse terminal nose-leaf thickened, divided by two vertical incisions into a narrow central acutely-pointed process and a triangular portion on either side; front margin of the transverse leaf concave and divided into cells by three vertical ridges as in other species; on each side of the horseshoe-shaped leaf two small leaflets, and a single one in front (Plate VIII. fig. 4).

Wing-membrane from the ankles or tarsus; posterior margin of the interfemoral membrane straight; projecting portion of the tail nearly as long as the thumb.

First upper premolar minute, in the tooth-row.

Fur reddish brown or reddish yellow above and beneath, the bases of the hairs paler.

Length, head and body 1″·5, tail 0″·85, free from membrane 0″·15, head 0″·6, ear 0″·5, forearm 1″·6, thumb 0″·22; third finger—metacarp. 1″·1, 1st. ph. 0″·5, 2nd ph. 0″·5; fifth finger—metacarp. 1″, 1st ph. 0″·4, 2nd ph. 0″·3; tibia 0″·5, foot 0″·25.

Hab. Austro-Malayan Subregion (Morty Island, Batchian, Amboyna; New Ireland).

This species, which is probably the smallest of the genus except *Ph. pygmæa*, has, for the size of its body, the longest forearm. In every other known species (except *Ph. commersonii* from the Ethiopian Region) the forearm is shorter than the head and body; in this species it is longer.

a. ad. sk., in al.	Morty Island.	A. R. Wallace, Esq. [C.].
b–e. ad. sks.	Batchian Island.	A. R. Wallace, Esq. [C.].
f. ad. sk.	New Ireland.	Rev. G. Brown [C.].

3. **Phyllorhina stoliczkana.**

Asellia stoliczkana, *Dobson*, *P. A. S. B.* May, 1871, p. 106; *J. A. S. B.* 1871, p. 263, pl. xx. fig. 1.

Phyllorhina trifida, *Peters*, *P. Z. S.* June 1871, p. 513; *MB. Akad. Berl.* 1871, p. 315.

Phyllorhina stoliczkana, *Dobson*, *Monogr. Asiat. Chiropt.* p. 61, figs. *a*, *b* (1876).

Ears nearly as broad as long, with acutely pointed tips; outer margin deeply concave beneath the tip, then very convex, almost meeting the inner margin at the base. Front edge of the horseshoe portion of the nose-leaf raised, bent up in the middle, and separated from the lip by an underlying fold of membrane; on each side of the horseshoe a double fold of membrane; upper transverse nose-leaf large, erect, not thickened as in *P. tricuspidata*; upper portion or crest convex in front, overhanging the concave base, which is divided into four cells by three prominent vertical ridges; the form of the crest is that of an isosceles triangle with

an obtuse vertical angle; the apex of this triangle is divided into three points by two narrow perpendicular incisions, extending halfway to the base, the extremities of which are attached to the membrane forming the horseshoe by a vertical band on either side (Plate VIII. fig. 5).

Wing-membrane attached to the lower part of the ankles; tail of six caudal vertebræ, the last two free.

Fur long and silky, above bicoloured, pure white at the base and for two thirds its length, the remaining portion purplish brown; beneath dirty white throughout.

Length, head and body 1″·6, tail 1″·2, head 0″·6, ear 0″·4 × 0″·35, forearm 1″·5, thumb 0″·2, third finger 2″·6, fifth finger 1″·8, tibia 0″·68, foot 0″·3.

Hab. Pinang.

Type in the collection of the Indian Museum, Calcutta.

4. Phyllorhina commersonii.

Rhinolophus commersonii, *Geoffroy, Annal. du Muséum*, xx. p. 263, pl. 5 (1813).
Rhinolophus gigas, *Wagner, Wiegm. Archiv*, 1845, p. 148; *Suppl. Schreb. Säugeth.* v. p. 650 (1855).
Phyllorhina vittata, *Peters, Reise nach Mossambique*, p. 32, pl. 6, pl. 13. figs. 7–13; *Temminck, Esquiss. Zoolog. sur la côte de Guiné*, p. 72 (1853).
Macronycteris gigas, *Gray, P. Z. S.* 1866, p. 82.
Phyllorhina commersonii, *Peters, MB. Akad. Berl.* 1871, p. 318.

Ears narrow, attenuated towards their extremities, which are very narrowly rounded off; inner margin of the conch slightly convex in lower, straight in upper half, outer side shortly emarginate immediately beneath the tip, becoming gradually convex downwards (Plate IX. fig. 2); head very long, and thick in front; nose-leaf comparatively small, not equalling the muzzle in width; transverse leaf as wide as the horizontal leaf, short, upper margin straight, concave, front surface divided by a central vertical ridge, with an ill-defined ridge on each side; sides of the muzzle with four erect longitudinal leaflets; immediately behind the nose-leaf, and in a line between the eyes, the longitudinal opening of a large frontal glandular sac.

Forearm as long as the head and body; wings from the ankles; interfemoral membrane short, straight or concave behind; the last caudal vertebra, or the last and half the antepenultimate vertebra, free.

Fur everywhere short and limited to the body. Above, on the head and neck and anterior part of the neck light brown with greyish extremities, a more or less broad band of the same colour on each shoulder confluent in the centre of the back and extending to the root of the tail; along the sides of the body grey, approaching pure white in some specimens; beneath white, except a patch of brown on each shoulder, and the fur along the centre of the chest

and abdomen has a dark shade. Some specimens have the fur of a reddish tinge throughout.

First upper premolar minute, external, scarcely raised above the level of the gum; canines remarkably long and strong, proportionally much larger than in any other species of the genus.

Length, head and body 4″·4, tail 1″·7, head 1″·6, ear 1″·2 × 0″·7, nose-leaf 0″·5 × 0″·45, forearm 4″·45, thumb 0″·75; third finger—metacarp. 3″, 1st ph. 1″·45, 2nd ph. 1″·85; fourth finger—metacarp. 2″·85, 1st ph. 1″·15, 2nd ph. 0″·75; fifth finger—metacarp. 2″·75, 1st ph. 1″·15, 2nd ph. 0″·75; tibia 1″·6, calcaneum 0″·85, foot 0″·9.

Hab. Ethiopian region (Gambia, Angola, Zanzibar, Cape Delgado Islands, Madagascar).

This, the largest species of the family, is widely distributed throughout the Ethiopian region, from the west coast of Africa to Madagascar. It varies considerably in size, the length of the forearm in some adult individuals attaining a length of nearly 4½ inches, while in others it is an inch less.

a. ♀ ad., al.	Gambia.	Earl of Derby [P.].
b. ♂ ad., al.	Benguela.	Dr. J. E. Gray [P.].
c. ad. sk.	Angola.	
d. ♀ ad., al.	Zanzibar.	Purchased.
e. ♂ ad., al.	Zanzibar.	Dr. Kirk [P.].
f. ♂ ad., al.	Africa.	Mr. Brandt's Coll.
g. ad. sk.	Vohima, Madagascar.	Purchased.
h. ♀ ad., al.	Madagascar.	Purchased.
i. ♂ ad., al.	No history.	
j. ad. sk.		Purchased
k. skeleton.	Benguela.	Dr. J. E. Gray [P.].

5. Phyllorhina cyclops.

Phyllorhina cyclops, *Temminck, Esquiss. Zoolog. sur la côte de Guiné*, p. 75 (1853).

Ears nearly as long as the head, attenuated in their upper thirds and subacutely pointed, very similar in shape to those of *Ph. commersonii* (Plate IX. fig. 1); the nose-leaf is peculiar and characteristic, though in general structure agreeing with that of most of the species of the genus (Plate IX. figs. 1*a*, 1*b*); from the centre of the base of the sella a club-shaped process about one tenth of an inch long is directed forwards (fig. 1*b*), and a similar but more slender and somewhat longer process projects vertically upwards from the centre of the upper margin of the transverse erect nose-leaf, its base being continuous with the central ridge dividing the concave front surface of this part of the nose-leaf, which is divided by three ridges into four cells altogether, as in *Ph. speoris*, and is narrower than the horizontal horseshoe-shaped portion, which projects considerably beyond the muzzle in front, and, laterally, conceals two secondary leaflets on the sides of the muzzle; the margins of the eyelids are very prominent, and on the forehead a large frontal sac with a longitudinal aperture is found in the male, as in *Ph. commersonii*.

Wing-membrane extending to the metatarsus; interfemoral membrane small, angularly emarginate behind, the end of the tail projecting.

Fur dark brown above and beneath.

Teeth as in *Ph. commersonii*.

Length (of an adult ♂), head and body 2″·8, tail 0″·85, head 1″·1, ear 1″·15, nose-leaf 0″·5 × 0″·5, forearm 2″·45, thumb 0″·45; third finger—metacarp. 1″·85, 1st ph. 0″·7, 2nd ph. 1″·05; fourth finger—metacarp. 1″·85, 1st ph. 0″·45, 2nd ph. 0″·55; fifth finger—metacarp. 1″·7, 1st ph. 0″·6, 2nd ph. 0″·5; tibia 1″·15, calcaneum 0″·6, foot 0″·65.

Hab. West Africa.

This very remarkable species, at once distinguished by the peculiar club-shaped processes projecting from the nose-leaf, is evidently closely allied to *Ph. commersonii*, inhabiting the same zoological region, with which it agrees in the form of the ears, in the structure and position of the frontal glandular sac, and in the general form of the teeth.

a. ♂ ad., al.	Cameroon Mountains.	Purchased.
b. ad. sk.	W. Africa.	Dr. Günther [P.].

6. Phyllorhina armigera.

Rhinolophus armiger, *Hodgson, Journ. Asiat. Soc. Beng.* iv. p. 699 (1835); *Wagner, Suppl. Schreb. Säugeth.* v. p. 657 (1855).

Hipposideros armiger, *Blyth, Journ. Asiat. Soc. Beng.* 1844, p. 346; *Jerdon, Mammals of India*, p. 27 (1867).

Hipposideros diadema, *Cantor* (*non Geoffroy*), *Journ. Asiat. Soc. Beng.* 1846, p. 181.

Gloionycteris armigera, *Gray, P. Z. S.* 1866, p. 82.

Phyllorhina swinhoei, *Peters, P. Z. S.* 1870, p. 616.

Phyllorhina armigera, *Peters, MB. Akad. Berl.* 1871, p. 317; *Dobson, P. Z. S.* 1873, p. 242; *Monogr. Asiat. Chiropt.* p. 64, figs. *a*, *b* (heads of ♂ & ♀) (1876).

The hinder erect nose-leaf narrow, not so broad as the horseshoe; upper edge sinuate, slightly elevated in the centre and at either extremity; vertical ridges beneath well developed, prominent, enclosing moderately deep cells. The wart-like elevations on each side above the eyes, so constant in the species of the genus, are, in this species, usually greatly developed, forming large, thickened, longitudinal elevations, extending forwards on each side of the posterior erect nose-leaf, and backwards towards the frontal sac. In old males the development of these elevations is very great, and they form posteriorly the raised boundaries of a triangular fleshy naked space on the forehead, at the apex of which the large frontal sac is placed (Plate IX. fig. 3). These parts are not so well developed in young males and females; in the latter they appear as comparatively small longitudinal wart-like bodies covered with straight hairs, and in them also the frontal sac is small and placed close behind the posterior erect nose-leaf. On either side of the muzzle four erect longitudinal leaflets.

Wing-membrane attached to the tibia a short distance above the ankle-joint; tail long, last vertebra generally half free; interfemoral membrane triangular behind.

Colour of the fur variable; in a large specimen from Darjeeling dark brown, somewhat paler at the base; in two females from Nipal, on the dorsal surface the fur is tricoloured—at the base, for rather more than one third its length, pale sepia, then a band of grey for the same extent, the remaining portion of the hair dark sepia with paler tips; beneath, at the base and for half their length, of a shade intermediate between that of the upper and lower thirds of the hairs on the upper surface, the remaining portions to the tips of a lighter shade of the same colour.

This is the largest Asiatic species of the genus yet discovered; the fully expanded wings measure nearly two feet across the body from tip to tip.

Length (of an adult ♂, the type), head and body 4″·2, tail 2″·1, head 1″·4, ear (anteriorly) 1″·15, forearm 3″·8, thumb 0″·5, third finger 5″, fifth finger 4″, tibia 1″·6, foot 0″·7.

Hab. Himalaya (Masuri, Darjeeling, Nipal, Khasia Hills); Ceylon; China (Amoy).

(For notes on the habits of this species, see 'Monograph of the Asiatic Chiroptera,' referred to above.)

a, *b*. ♂ & ♀ ad., al. (types).	Nipal.	B. H. Hodgson, Esq. [P.].
c. ad. sk.	Nipal.	B. H. Hodgson, Esq. [P.].
d. ♀ imm., al.	Khasia Hills.	G. E. Dobson, M.B. [E.].
e. imm. sk.	China.	Mr. Fortune [C.].
f. ad. sk.	China.	Mr. Fortune [C.].
g. ad. sk.	China.	J. R. Reeves, Esq. [P.].
h–*j*. ad. sks.	China (Amoy).	R. Swinhoe, Esq. [P.].
(Types of *Phyllorhina swinhoei*, Ptrs.)		
k, *l*. ad. sk.	Pinang.	Dr. Cantor [P.].
m. skull of *c*.		

7. Phyllorhina leptophylla.

Phyllorhina leptophylla, *Dobson, Journ. Asiat. Soc. Beng.* 1874, p. 234; *Monogr. Asiat. Chiropt.* p. 66 (1876).

Ears rather large, nearly as long as the head, broad and triangular, with subacute tips; the outer margin of the ear-conch slightly concave beneath the tip; upper transverse portion of the nose-leaf small, its upper edge simple, thin, narrower than the horseshoe-shaped part, the vertical ridges dividing its front surface discernible at the base only; horseshoe with a small notch in the centre of its front free edge; on the sides of the muzzle external to the horseshoe three small leaflets; frontal sac small, placed at some distance behind the nose-leaf.

Wings from the tibiæ near the ankles; interfemoral membrane triangular behind, the extremity of the tail projecting.

Fur and integuments dark brown throughout.

Length (of an adult ♂ preserved in alcohol), head and body 2″·5,

tail 1″·65, ear 0″·9, forearm 2″·45, thumb 0″·4, third finger 3″·55, fifth finger 2″·85, tibia 1″, calcaneum 0″·7, foot 0″·45.

Hab. Khasia Hills, Eastern Bengal.

This species may be at once distinguished from *Ph. armigera* by its considerably smaller size, by the structure of the transverse portions of the nose-leaf, and by the incised free edge of the horseshoe.

Type in the collection of the Indian Museum, Calcutta.

8. Phyllorhina diadema.

Rhinolophus diadema, *Geoffroy, Ann. Mus. d'Hist. Nat.* xx. p. 263.
Rhinolophus nobilis, *Horsfield, Zool. Research. in Java.*
Rhinolophus griseus, *Meyen, Nova Acta Acad.* xvi. 2, p. 608.
Rhinolophus diadema *et* nobilis, *Temminck, Monogr. Mammal.* ii. p. 10.
Hipposideros nobilis, *Cantor, Journ. Asiatic Soc. Beng.* xv. p. 182.
Hipposideros lankadiva, *Kelaart, Prodr. Faun. Zeylan.* p. 19.
Phyllorhina diadema, *Peters, MB. Akad. Berl.* 1871, p. 315; *Dobson, Monogr. Asiat. Chiropt.* p. 61 (1876).

The hinder erect nose-leaf equals the horseshoe and slightly exceeds the sella in width, its free margin forming a segment of the circumference of a circle, with a small blunt projection in the centre, and three vertical ridges on its concave front surface; sella large, with a prominent ridge in the centre, forming a small projection above, and one smaller on each side; sides of the muzzle with prominent vertical leaves, three on each side; no frontal pore. Ears moderate, acutely pointed, concave beneath the tip (Plate IX. fig. 4).

Wings from the ankles; interfemoral membrane large, triangular behind; last caudal vertebra free.

Fur, above, pale shining buff for two thirds the length of the hair, the remaining portion chocolate or reddish brown, with ashy extremities; beneath, light greyish or buffy brown throughout.

Length, head and body 3″·4, tail 2″·3, ear 1″ × 0″·8, nose-leaf 0″·45 × 0″·35, forearm 3″·4, third finger 4″·7, fifth finger 3″·7, tibia 1″·45, foot 0″·6.

Hab. Peninsula of India generally, from the Himalaya to Southern India; Ceylon, Burma, Sumatra, Java, Borneo, Timor, Batchian Island, Amboyna, Aru Islands, Philippine Islands.

Type in the collection of the Paris Museum.

a. ♀ ad., al.	Ceylon.	Purchased.
b. ad. sk.	Ceylon.	Dr. Kelaart [P.].
c. ad. sk.	Pinang.	E. I. House Collection.
d, e. ad. sks.	Java.	Purchased.
f. ad. sk.	Java.	Leyden Museum.
g. ad. sk.	Borneo.	Sir J. Brooke [P.].
h. ♂ ad., al.	Philippine Islands.	
i, j. ♀ ad., al	Philippine Islands.	
k. ♀ ad., al.	Philippine Islands.	Purchased.
l. ad. sk.		Purchased.
m. ad. sk.		A. R. Wallace, Esq. [C.].
n. ad. sk.	No history.	
o. ad. sk.	Timor.	Purchased.
p. skeleton.		Purchased.

? Var. *a*.

Phyllorhina masoni, *Dobson, Journ. Asiat. Soc. Beng.* 1872, p. 338; *Monogr. Asiat. Chiropt.* p. 62, fig. (head), 1876.

The concave front surface of the erect nose-leaf divided into two cells only by a single central vertical ridge. From the under surface of the symphysis of the mandible a small conical bony process projects downwards, about equal to the lower canine tooth in vertical extent, and covered by the integument.

Length, head and body 3″·65, tail 1″·65, ear 1″·1, forearm 3″·35, thumb 0″·6, third finger 5″, fifth finger 3″·9, tibia 1″·35, foot 0″·65.

Hab. Moulmein, Burma.

Such are the characters of a single specimen, an adult male, preserved in the collection of the Indian Museum, Calcutta. Together with the absence of the vertical ridges dividing the front surface of the erect nose-leaf on either side of the central ridge is associated a slight difference in the relative measurements of the bones of the extremities, and the occurrence of the peculiar process from the mandible described above. In other respects, however, this specimen agrees so closely with typical examples of *Ph. diadema* that I now believe the differences in structure exhibited by it are, probably, individual peculiarities only.

9. Phyllorhina nicobarensis.

Phyllorhina nicobarensis, *Dobson, Journ. Asiat. Soc. Beng.* 1871, p. 262, pl. xx. fig. 2; *Monogr. Asiat. Chiropt.* p. 63, figs. *a*, *b* (head and nose-leaf) (1876).

Ears large, acutely pointed, outer margin slightly concave beneath the tip; no frontal sac behind the nose-leaf; upper margin of the transverse leaf simple, forming an arc of a circle, folded back and overhanging the concave front surface, which is divided into *two cells only* by a single central vertical ridge; in front the margin of the horseshoe has three small points.

Wing-membrane from the base of the metacarpal bone of the outer toe; tail of six vertebræ, the last free.

Fur, above, light brown at the base, then greyish brown, with light brown extremities; beneath pale brownish grey.

Length, head and body 3″, head 1″·1, tail 1″·7, ear 0″·9, forearm 2″·6, third finger 3″·7, fifth finger 2″·8, tibia 1″, foot 0″·45.

Hab. Nicobar Islands.

Type in the collection of the Indian Museum, Calcutta.

This species resembles *Ph. diadema* generally, but is at once distinguished by the erect nose-leaf being divided in front by a single vertical ridge only, by the different attachment of the wing-membranes to the hinder extremities, and by its much smaller size.

10. Phyllorhina pygmæa.

Rhinolophus pygmæus, *Waterhouse, P. Z. S.* 1843, p. 67.
Phyllorhina pygmæa, *Gray, P. Z. S.* 1866, p. 82; *Peters, Monatsb. Akad. Berl.* 1871, p. 317; *Dobson, Monogr. Asiat. Chiropt.* p. 63 (1876).

Ears oval, with short subacute tips, inclined outwards, the outer margin shortly but conspicuously concave in the upper fourth; nose-leaf large, upper margin of the transverse terminal portion regularly convex, forming an arc of a circle, its front surface with three well-marked vertical ridges (Plate IX. fig. 5); horseshoe projecting by its free margin beyond the upper lip; two vertical leaves on each side; terminal leaf wider than the sella in front; no frontal pore.

Thumb very small. Wings to the tarsus. Interfemoral membrane slightly triangular behind; last caudal vertebra free.

The posterior margin of the cingulum of the canine develops a distinct cusp, and also the anterior margin of the second premolar.

Length, head and body 1″·4, tail 0″·95, ear 0″·5 × 0″·4, nose-leaf 0″·3 × 0″·25, forearm 1″·45, thumb 0″·15, third finger 2″, fifth finger 1″·5, tibia 0″·5, foot 0″·25.

Hab. Philippine Islands.

a. ♀ ad., al. (type). Philippine Islands. Zool. Soc. Coll.

11. Phyllorhina fuliginosa.

Phyllorhina fuliginosa, *Temminck, Esquiss. Zoolog. sur la côte de Guiné*, p. 77 (1853); *Peters, MB. Akad. Berl.* 1871, p. 324.

Ears much shorter than the head; basal half of the inner margin of the conch exceedingly convex, so as to approach close to the erect nose-leaf, upper half slightly convex, tip subacute, slightly inclined outwards, upper third of the outer margin concave, lower two thirds convex, antitragus semicircular without projection (Plate IX. fig. 6); nose-leaf small, horseshoe-shaped membrane very narrow in front of the nasal apertures; on each side two secondary leaflets; posterior erect leaf short with a slightly convex free margin, its concave front surface not divided by distinct vertical ridges, but in some specimens there is a faint indication of a central ridge, with an ill-defined ridge near the outer margin of the leaf on either side; no frontal glandular sac, but the forehead, in the position corresponding to the usual place of the sac in other species, is naked.

Thumb as long as the foot without the claws; wings from the ankles; tail long, the extremity projecting slightly beyond the triangular interfemoral membrane.

Fur varying considerably in colour: in some specimens dark brown or even black, the base of the hairs much paler, almost white, beneath paler throughout; in others the hairs are bright orange or reddish yellow above and beneath. The specific name has therefore been ill-chosen.

Length, head and body 2″, tail 1″·2, head 0″·8, ear 0″·6×0″·55, forearm 1″·95, thumb 0″·35; third finger—metacarp. 1″·4, 1st ph. 0″·7, 2nd ph. 0″·8; fifth finger 2″·2, tibia 0″·85, calcaneum 0″·38, foot 0″·4.

Hab. West Africa (Old Calabar; Fernando Po).

a. ♂ ad., al.	Fernando Po.	Purchased.
b. ♀ ad., al.	Old Calabar.	A. Murray, Esq. [P.].
c, *d*. ad. sks.		Purchased.

12. Phyllorhina caffra.

Rhinolophus caffer, *Sundevall, Œfvers. Akad. Förh. Stockholm*, iii. p. 118 (1846); *Wagner, Suppl. Schreb. Säugeth.* v. p. 655 (1855).
Phyllorhina gracilis *et* caffra, *Peters, Reise nach Mossambique*, pp. 36–39, pls. 7, 8.
Phyllorhina caffra, *Temminck, Esquiss. Zoolog. sur la côte de Guiné*, p. 78 (1853); *Peters, MB. Akad. Berlin*, 1871, p. 325.
Phyllorhina bicornis, *Heuglin, Beitr. Fauna Nordöst-Afrika's*, p. 7 (1861).

In size and in the form of the nose-leaf closely corresponding with *Ph. fuliginosa*, but at once distinguished by the much smaller thumb and foot, by the different form of the ears, and, especially, by the presence of a distinct frontal glandular sac.

Ears slightly shorter than in *Ph. fuliginosa*, but the inner margin of the conch is similarly strongly convex in its lower half: in its upper half, however, it is less convex than in that species, and, owing to this and to the greater convexity of the lower two thirds of the outer margin, the subacutely pointed tip does not project outwards, but is directed almost vertically upwards; at the commencement of the antitragus at the lower third of the outer margin a small but distinct acutely pointed projection.

As in *Ph. fuliginosa*, the nose-leaf is very narrow in front of the nostrils, and there are two secondary leaflets on either side; but the erect leaf, though very similar in outline, is somewhat larger, and its concave front surface has no trace of vertical dividing ridges.

Frontal glandular sac small in the male; its position very indistinctly marked in the female.

Thumb short, the metacarpal bone considerably longer than the first phalanx, and wholly inclosed in the antebrachial membrane; wings from the ankles or from the tarsi; interfemoral membrane large, the last caudal vertebra quite free, projecting abruptly from the straight posterior margin of the membrane; feet very small, but slightly longer than the thumb.

Fur, above, greyish brown, the extremities of the hairs darker; beneath, paler. The inner side of the ear-conch clothed with hairs; in some specimens the whole concave surface of the conch is more or less covered.

Length (of an adult ♀), head and body 2″, tail 1″·2, head 0″·8, ear 0″·55×0″·55, forearm 1″·85, thumb 0″·25; third finger—metacarp. 1″·35, 1st ph. 0″·6, 2nd ph. 0″·65; fifth finger—metacarp.

1″·2, 1st ph. 0″·5, 2nd ph. 0″·4; tibia 0″·8, calcaneum 0″·4, foot 0″·28.

A specimen in the collection from Dar-es-Salam is considerably larger than most examples of this species, having the forearm 2″, the metacarpal bone of the third finger 1″·45, and the tibia 0″·85; the ears and nose-leaf appear smaller, and the former are more covered with hair.

Hab. Africa (Abyssinia, Zanzibar, Cape Delgade, Tete, Port Natal, Damara country, Benguela, Angola, Gaboon, Cameroon Mountains). Probably generally distributed throughout the tropical regions of that continent.

a. ad. sk.	Cameroon Mountains.	Mrs. Burton [P.].
b. ad. ♀, al.	Elloby District, Gaboon.	H. Ansell, Esq. [P.].
c. ad. ♀, al.	Gaboon.	H. Ansell, Esq. [P.].
d. ad. ♂, al.	Angola.	Dr. J. E. Gray [P.].
e–g. imm. ♂, al.	Angola.	Dr. J. E. Gray [P.].
h–l. ad. ♂ & ♀, al.	Angola.	Dr. J. E. Gray [P.].
m. ad. ♂, al.	Angola.	Mr. Rich [C.].
n. ad. sk.	West Africa.	
o. ad. ♀, al.	South Africa.	Stockholm Museum.
p. ad. sk.	Port Natal.	Stockholm Museum.
q. ad. ♂, al.	Zanzibar.	Purchased.
r–v. ad. ♂ & ♀, al.	East Africa.	Dr. Kirk [C.].
w, x. ad. ♀, al.	East Africa.	Dr. Livingstone [C.].
y. ad. ♂ skin in al.	Dar-es-Salam.	Purchased.
z. ad. ♂, al.		Zool. Soc. Coll.
a′. skull.		Zool. Soc. Coll.
b′. skull.	East Africa.	Dr. Kirk [C.].

13. Phyllorhina galerita.

Hipposideros galeritus, *Cantor, Journ. Asiat. Soc. Beng.* 1846, p. 183.
Phyllorhina labuanensis, *Tomes, P. Z. S.* 1858, p. 538; *Peters, MB. Akad. Berl.* 1871, p. 321.
Phyllorhina longicauda, *Peters, l. c.* 1861, p. 708; 1871, p. 321.
Phyllorhina brachyota, *Dobson, Journ. Anat. Soc. Beng.* 1874, p. 237.
Phyllorhina galerita, *Dobson, Monogr. Asiat. Chiropt.* p. 69 (1876).

Ears very similar in shape and in size to those of *Ph. caffra*, with which this species also agrees closely in general measurements. It is, however, at once distinguished by the very different development of the nose-leaf, which is much larger, and resembles that of the well-known species *Ph. speoris*.

The horseshoe-shaped portion of the nose-leaf is well developed, and extends as far forwards in front of the nasal apertures as the upper extremity of the muzzle; it is nearly as wide in front as behind the nasal apertures, and its anterior free margin is undivided; on either side two secondary leaflets as in *Ph. caffra*; sella large, but exceeded in width by the transverse erect leaf behind, which is also well developed, the sides nearly as high as the centre, so that its upper margin is almost straight; its concave front surface is divided by three very well-defined vertical ridges into four cells. Frontal glandular sac distinct but small, not larger than in the preceding species: in the female very indistinctly marked. Thumb

and foot small, as in *Ph. caffra*; wings from the metatarsi*; interfemoral membrane large, triangular behind; extremity of the tail projecting slightly.

Fur, above, light brown at base, the terminal third of the hairs dark reddish brown, the extreme tips paler; beneath similar but somewhat paler. The fur on the shoulders and along the spine darker. Ears and wing- and interfemoral membranes very dark brown. Specimens in colourless alcohol appear very dark brown throughout. A specimen from Sarawak has the fur bright ferruginous.

The inner side of the ear-conch along the inner margin is thickly covered with hair, and the back of the ear, except a small portion below the tip and along the upper half of the outer margin, is covered.

The second upper premolar is separated from the canine by a wider interval than usual in this genus; in the midst of this space, but rather to the outside, the small, scarcely distinguishable first premolar is placed.

Length, head and body 2″, tail 1″·4, ear 0″·55 × 0″·55, forearm 1″·75, thumb 0″·25; third finger—metacarp. 1″·35, 1st ph. 0″·55, 2nd ph. 0″·8; fifth finger—metacarp. 1″·15, 1st ph. 0″·5, 2nd ph. 0″·5; tibia 0″·72, calcaneum 0″·3, foot 0″·3.

Hab. Peninsula of India (Deccan); Pinang; Java; Labuan.

This species appears to vary in the size of the nose-leaf, in the length of the tail, and in the place of origin of the wing-membrane from the hinder extremities. Thus, although not differing in structure, the nasal membranes in the type specimen from Pinang appear much larger than in specimens from other localities (which agree with it almost exactly in general measurements), and the type of *Ph. longicauda*, Ptrs., from Java has the tail considerably longer. Intermediate forms, however, occur, such as those described as *Ph. labuanensis*, Tomes, from Labuan Island, and *Ph. brachyota*, Dobson, from Central India.

a. ad. sk.	Singapore.	A. R. Wallace, Esq. [C.].
b. ad. sk.	Sarawak.	A. R. Wallace, Esq. [C.].
	(Labelled "*Phyllorhina labuanensis*" by Tomes.)	
c. ad. sk.	Ceylon.	Dr. Kelaart [P.].
d. ♀ ad., al.	Lingasugúr, Dekkan.	G. E. Dobson, M.B. [E.].

14. Phyllorhina cervina.

Rhinolophus cervinus, *Gould, Mammals of Australia*, iii. pl. xxxiv. (1853).

Phyllorhina cervina, *Peters, MB. Akad. Berl.* 1871, p. 321 (excl. syn.).

In general form and size very similar to *Ph. galerita*, but distinguished by the much smaller and narrower nose-leaf, by the larger

* In the type specimen the wings appear to arise from the ankles; but this may have been caused by shrinking of the membrane in the drying-process. The point of attachment of the wing-membrane to the legs and feet varies so much in this genus that it cannot be depended upon in distinguishing species.

frontal glandular sac, which equals in size that of *Ph. speoris*, and by the much greater length of the calcaneum.

Ears about the same size and very similar in general outline to those of *Ph. caffra* and *Ph. galerita*, but the small projection at the commencement of the lower third of the outer margin of the ear-conch is as acutely pointed as in *Ph. speoris*, with which this species also agrees in the large size and structure of the frontal sac; the horseshoe-shaped part of the nose-leaf is much narrowed in front of the nasal apertures, in *Ph. galerita* it is almost as broad in front as behind; in other respects the nasal appendages agree in these species, and there are also two secondary leaflets external to the horseshoe (Plate IX. fig. 7).

Thumbs and feet as in *Ph. galerita*; wing-membrane extending to the tarsus; interfemoral membrane moderate, triangular behind; last caudal vertebra long and half free.

Fur reddish brown, darker above, paler beneath; the extremities of the hairs on the back darker than their bases.

Length, head and body 2″, tail 1″·1, head 0″·7, ear 0″·55, forearm 1″·75, thumb 0″·25; third finger—metacarp. 1″·25, 1st ph. 0″·6, 2nd ph. 0″·7; fifth finger—metacarp. 1″·05, 1st ph. 0″·45, 2nd ph. 0″·4; tibia 0″·65, calcaneum 0″·45, foot 0″·3.

The above measurements are taken from an apparently adult male from New Guinea. The type, a dried skin, from Albany Island, Cape York, is slightly larger.

Hab. Australia (Albany Island, Cape York); Aru Islands; Waigiou Island; New Guinea.

This species agrees with the preceding species and with *Ph. caffra* in the shape of the ears and in the small size of the thumb and foot. While resembling *Ph. caffra* in the small development of the horseshoe-shaped portion of the nose-leaf, it corresponds more closely with *Ph. speoris* in the large size and form of the frontal sac.

a. ♀ ad. sk. (type).	Albany Island.	Voy. of the 'Rattlesnake.'
b. ♀ ad. sk. in al.	Cape York.	
c–g. ♂ & ♀ ad., al.	New Guinea.	Mrs. Stanley [P.].
h. ad. sk.	Duke of York Island.	Rev. G. Brown [C.].
i. ad. sk.	Waigiou Island.	A. R. Wallace, Esq. [C.].

15. Phyllorhina speoris.

Vespertilio speoris, *Schneider, Schreber, Säugeth.* pl. 59 B (1826).
Rhinolophus dukhunensis, *Sykes, Cat. Mamm. of Dukhun*, 1831, p. 4.
Hipposideros apiculatus *et* penicillatus, *Gray, Mag. Zool. & Bot.* 1838, ii. p. 492.
Rhinolophus speoris, *Elliot, Madras Journ. Sci.* x. p. 7 (1839).
Hipposideros speoris, *Blyth, Journ. As. Soc. Beng.* 1844, p. 489.
Hipposideros speoris *et* templetonii, *Kelaart, Prod. Faun. Zeylan.* p. 17.
?Phyllorhina speoris, var. taitiensis, *Zelebor, Novara Säugeth.* 1868, p. 13.
Phyllorhina speoris, *Peters, MB. Akad. Berl.* 1871, p. 320; *Dobson, Monogr. Asiat. Chiropt.* p. 67, figs. *a*, *b* (nose-leaf) (1876).

Slightly larger than any of the four preceding species, and with longer and narrower ears, owing to the less convexity of their inner margins; upper third of the inner margin of the ear-conch slightly convex, almost straight, tip narrowly rounded-off or subacutely pointed, not projecting outwards; upper third of the outer margin equally concave, lower two thirds convex, with a small but very distinct spine-like projection at the commencement of the lower third; horseshoe-shaped horizontal nose-leaf narrow, with three parallel leaflets on the muzzle on each side; transverse terminal leaf broader than the sella, upper margin regularly convex, front concave surface with three very distinct vertical ridges, whereof the centre one is longest; a large frontal sac in male, with a transverse aperture and swollen margins, in female much smaller (see figures in 'Monograph Asiatic Chiroptera,' referred to above).

Wing-membrane from the tibia near the ankle; interfemoral short, square behind; the last osseous caudal vertebra and half the antepenultimate vertebra free.

Fur, above, brown, white at the base; beneath, similar but paler. The shade of brown varies considerably in different individuals.

Length (of an adult ♂), head and body 2″·4, tail 0″·85, tail free from membrane 0″·12, head 0″·85, ear 0″·7 × 0″·5, forearm 2″·05, thumb 0″·3, third finger 2″·75, fifth finger 2″·25, tibia 0″·9, calcaneum 0″·5, foot 0″·38.

Hab. The Oriental Region (Peninsula of India, Ceylon, Burma, Java, and probably the other islands of the Malay archipelago in the Indo-Malayan Subregion).

If this species be really an inhabitant of the island of Tahiti, as the name given by Zelebor implies, it has by far the widest geographical distribution of any species of the genus.

a, *b*. ad. sks.	India.	
c. ♀ ad., al.	Lingasugúr, Deccan, India.	G. E. Dobson, M.B. [E.].
d–*h*. ad. sks.	Madras.	Sir Walter Elliot [P.].
i. ♂ ad., al.	Madras.	Sir Walter Elliot [P.].
j. ♀ ad., al.	Madras.	Sir Walter Elliot [P.].
k–*q*. ♂ & ♀ juv. & ad., al.		Capt. Sir E. Belcher [C.].
r–*u*. ad. sks.	Trincomalee.	Dr. Kelaart [P.].
(Types of *Hipposideros aureus*, Kelaart.)		
v. ad. sk.	India.	Purchased.
w–*a'*. ♂ & ♀ ad., al.	India.	Sir A. Smith [P.].
b', *c'*. ♂ juv. & ♀ ad., al.	India.	Purchased.
d'–*f'*. ad. sks.	Ceylon.	Dr. Kelaart [P.].
(Types of *Hipposideros templetonii*, Kelaart.)		
g', *h'*. ad. sk.	Ceylon.	Dr. Kelaart [P.].
i', *j'*. ♂ & ♀ ad., al.	Ceylon.	Mr. Cuming's Coll.
k'–*m'*. ad. sk.	Java.	E. I. House Coll.
n'–*p'*. ♂ & ♀ ad., al.		Sir A. Smith [P.].
q'. ad. sk.		
r'. ad. sk.		
s'–*u'*. skulls.	Madras.	Sir Walter Elliot [P.].

16. Phyllorhina larvata.

Rhinolophus larvatus, vulgaris, insignis *et* deformis, *Horsfield, Zoolog. Research. in Java* (1824).
Rhinolophus insignis, *Temminck, Monog. Mammal.* ii. p. 74.
Hipposideros insignis, *Gray, Mag. Zool. & Bot.* ii. p. 492.
Hipposideros vulgaris, *Blyth, Journ. As. Soc. Beng.* xiii. p. 488.
Hipposideros larvatus, *Blyth, Cat. Mammal. Mus. As. Soc.* p. 26.
Speorifera vulgaris, *Gray, Proc. Zool. Soc. Lond.* 1866, p. 82.
Phyllorhina larvata, *Peters, MB. Akad. Berl.* 1871, p. 320; *Dobson, Monogr. Asiat. Chiropt.* p. 68, figs. *a*, *b* (nose-leaf) (1876).

Ears conspicuously larger than in *Ph. speoris*, nearly as long as the head, but otherwise very similar in general form to those of that species; the nose-leaf is also similar, but the upper margin of the transverse terminal leaf is less convex, and the front edge of the horseshoe is divided by a small notch; the frontal sac is well developed in adult males, as in *Ph. speoris*, but in adult females is comparatively much smaller, its place in dried skins being indicated only by a pencil of dark hairs (see figures referred to above in 'Monogr. Asiatic Chiroptera'). Some male specimens have the wart-like glandular eminences on each side of the transverse terminal leaf greatly developed, resembling closely the same parts in *Ph. armigera*, Hodgs. (Plate IX. fig. 8).

Wings from the ankle-joint, or from the tibia a little higher up; interfemoral membrane triangular behind; extreme tip of tail free.

The colour of the fur is extremely variable, according to locality and season; and the species has received almost as many different names as the specimens obtained have presented different colours. Generally reddish brown, the base of the hairs paler.

Length (of an adult ♂), head and body 3″, tail 1″·5, head 1″·1, ear 0″·95 × 0″·8, forearm 2″·45, thumb 0″·35, third finger 3″·4, fifth finger 2″·6, tibia 1″, calcaneum 0″·65, foot 0″·48.

Hab. Eastern Bengal (Khasia Hills, Sylhet; Goalparah, Arracan); Burma (Penang, Prome, Tenasserim); Siam; Java; Philippine Islands.

This species is closely allied to *Ph. speoris*; but is at once distinguished by its large ears, by the absence of the spine-like projection at the lower third of the outer margin of the conch, by the notch in the front margin of the nose-leaf, by the tail being almost wholly contained within the interfemoral membrane, which is triangular behind, and by its conspicuously larger size.

a. ad. sk.	India.	E. I. Company.
b. ♂ ad., al.	Siam.	Mr. Mouhot [C.].
c. ♂ ad., al.		Purchased.
d. ad. sk.	Java.	
e. ad. sk.	Manilla.	
f. skeleton.		Purchased.

The species in the following section are at once distinguished from all the preceding by the absence of secondary leaflets on the sides of

the muzzle external to the horseshoe, and by the simple form of the horseshoe, which is generally longer than broad, and has a very distinct ridge passing backwards from the centre of its front surface between the nasal apertures; the ears are also well developed, and the inner margin of the ear-conch more evenly convex throughout from the base to the tip.

17. Phyllorhina obscura.

Phyllorhina obscura, *Peters, MB. Akad. Berl.* 1861, p. 709, and 1871, p. 326; *Dobson, Monogr. Asiat. Chiropt.* p. 73 (1876).

Ears as long as the head, much longer than broad; inner margin of the ear-conch almost evenly convex from the base to the tip, which is short and subacutely pointed and inclined slightly outwards owing to the concavity which occupies the upper fourth of the outer margin, and commences rather abruptly beneath the tip; lower three fourths of the outer margin convex, at the commencement of the lower third a small well-defined projection, not so long or acutely pointed as in *Ph. speoris*. Nose-leaf well developed, the erect leaf large, wider than the sella, with a regularly convex upper margin and a concave front surface undivided by vertical ridges; horseshoe slightly wider than long, with an unnotched free front margin; no secondary leaflets external to the horseshoe; in males a well-developed frontal sac, which is quite rudimentary in females.

Wings from the metatarsi; calcaneum nearly as long as the foot; tail projecting abruptly (as in *Ph. speoris*) for more than one tenth of an inch beyond the free margin of the interfemoral membrane, which is straight behind between the extended calcanea.

Fur dark brown above, the base of the hairs very pale brown, almost white, then dark brown succeeded by light brown, the extremities dark brown; beneath, paler brown throughout; integument and ears dark brown.

Length (of an adult ♀ from Dinagut Island, Philippines), head and body 2″, tail 1″, free from membrane 0″·15, head 0″·75, ear 0″·75 × 0″·55, nose-leaf 0″·3 × 0″·25, forearm 1″·8, thumb 0″·3; third finger—metacarp. 1″·3, 1st ph. 0″·6, 2nd ph. 0″·7; fifth finger—metacarp. 1″·25, 1st ph. 0″·5, 2nd ph. 0″·45; tibia 0″·75, calcaneum 0″·35, foot 0″·4.

Hab. Philippine Islands (Mindanao, Dinagut Island).

a–d. ♂ & ♀ imm. et ad., al. Dinagut Island, Surigao. Purchased.

18. Phyllorhina doriæ.

Phyllorhina doriæ, *Peters, MB. Akad. Berl.* 1861; *Dobson, Monogr. Asiat. Chiropt.* p. 73 (1876).

Ears slightly shorter than the head; inner and outer margins of the ear-conch equally convex in their upper thirds, so that the ear is evenly rounded off above without a distinct tip. Transverse erect

portion of the nose-leaf thin, its slightly concave front surface undivided by vertical ridges; no secondary leaflets external to the horseshoe. Frontal sac small but distinct, close to the posterior margin of the base of the erect nose-leaf.

Wings from the metatarsi; interfemoral membrane straight behind; the extremity of the tail projecting 0″·15.

Fur reddish brown throughout.

Length, head and body 1″·8, tail 0″·8, head 0″·6, ear 0″·52, nose-leaf 0″·17 × 0″·16, forearm 1″·3, thumb 0″·18, third finger 2″·1, fifth finger 1″·7, tibia 0″·6, foot 0″·26.

Hab. Borneo (Sarawak).

This small species resembles the well known *Ph. bicolor* very closely, and is mainly distinguished from it by the undivided front surface of the erect portion of the nose-leaf.

19. Phyllorhina coronata.

Phyllorhina coronata, *Peters, MB. Akad. Berl.* 1871, p. 327; *Dobson, Monogr. Asiat. Chiropt.* p. 72 (1876).

Ears considerably shorter than the head; ear-conch rounded off above, with a slight flattening of the upper third of the outer margin. General form of the erect portion of the nose-leaf as in *Ph. diadema*, the upper free margin being thickened and raised in the centre, but its concave front surface is quite undivided by vertical ridges, and its sides are without connecting bands; no trace of secondary leaflets external to the horseshoe. Frontal sac distinct.

Wings from the tarsi; the extreme tip of the tail free.

Above brown, paler at the base of the hairs; beneath yellowish brown.

Length (of the type, a not full-grown ♀ specimen), head and body 2″·7, tail 1″·3, head 0″·85, ear 0″·6, nose-leaf 0″·32 × 0″·28, forearm 1″·85, thumb 0″·38; third finger—metacarp. 1″·3, 1st. ph. 0″·75, 2nd ph. 0″·76; fifth finger—metacarp. 1″·38, 1st. ph. 0″·56, 2nd ph. 0″·52; tibia 0″·7, calcaneum 0″·52, foot 0″·3.

Hab. Mindanao, Philippine Islands.

Type in the collection of the Berlin Museum.

20. Phyllorhina calcarata.

Phyllorhina calcarata, *Dobson, P. Z. S.* 1877, p. 122, fig. 8.

Ears as long as the head, triangular, with obtuse extremities; inner margin of the ear-conch very convex in lower half, almost straight above; outer margin slightly concave immediately beneath the tip, then straight. Nose-leaf simple in front, no secondary leaflets on the sides of the muzzle; horizontal leaf narrow like that of *Ph. bicolor*; the transverse terminal leaf as in *Ph. larvata*, broader than the sella, with three short ill-defined vertical ridges dividing its concave front surface; a small frontal pore behind the transverse nose-leaf.

First phalanx of the thumb as long as the metacarpal bone. Wings from the tarsi. Calcaneum remarkably long and strong, comparatively longer than in any other known species of the genus, exceeding half the tibia in length. Tail long, projecting one tenth of an inch beyond the interfemoral membrane.

Fur long and dense; above dark brown, the base of the hairs much paler, especially on the anterior half of the body; beneath orange-brown.

Length, head and body 2″·5, tail 1″·4, head 0″·85, ear 0″·85, nose-leaf 0″·3 × 0″·22, forearm 2″, thumb 0″·35; third finger—metacarp. 1″·3, 1st. ph. 0″·8, 2nd ph. 1″; fifth finger—metacarp. 1″·45, 1st. ph. 0″·65, 2nd ph. 0″·65; tibia 0″·9, calcaneum 0″·6, foot 0″·4.

A young specimen of this species from the same locality, with the epiphyses of the finger-bones quite ununited, has the forearm 1″·7 long, and the foot and the calcaneum are nearly as long as in the adult example from which the above description was taken; the fur is almost wholly dark brown above (though paler on the anterior half of the body than behind, as in the adult animal), and light greyish brown beneath.

Hab. Duke of York Island, New Ireland.

a. ad. sk., in al. (type). Duke of York Island. Rev. G. Brown [C.].

21. Phyllorhina bicolor.

Rhinolophus bicolor, *Temminck, Monogr. Mammal.* ii. p. 18 (1835–41).
Phyllorhina antricola, *Peters, MB. Akad. Berl.* 1861, p. 709.
Phyllorhina bicolor, *Peters, l. c.* 1871, p. 323; *Dobson, Monogr. Asiat. Chiropt.* p. 70 (1876).
(See synonymy of varieties below.)

Ears large, oval; the lower half of the inner margin of the ear-conch very convex, the summit rounded off broadly, the upper third of the outer margin straight (Plate IX. fig. 9).

Horseshoe small, square, scarcely as wide as the transverse terminal leaf, the concave front surface of which is divided into four cells by three distinct vertical ridges; no secondary leaflets external to the horseshoe; frontal glandular sac well developed, rudimentary in females, its position with difficulty determined in some, especially in immature females.

Wing-membrane extending to the ankles or tarsus; interfemoral membrane slightly angular behind, the extremity of the tail projecting, generally about one third of the last osseous caudal vertebra free.

Fur very variable in colour, in some specimens reddish chestnut, the base of the hairs and for three fourths their length pale reddish white; beneath similar but paler: in others the extremities of the hairs are dark reddish brown, and the basal three fourths almost pure white, while the fur beneath is pale yellowish white.

(For measurements see Table, p. 150.)

Hab. The Oriental Region. Typical examples have been found chiefly in the Indo-Malayan Subregion (Nicobar Islands, Java, Borneo, Philippine Islands). Two of the varieties (*Ph. amboinensis* and *Ph. aruensis*) extend into the northern parts of the Australian Region.

Ph. bicolor appears to vary considerably, not only in the colour of the fur, but also in the size of the ears and in the position of attachment of the wing-membrane to the posterior extremities. In the typical *Ph. bicolor* the ears are as long as the head; in the form described as *Phyllorhina fulva*, Gray, they reach their greatest development, and are considerably longer than the head; in *Ph. amboinensis*, Peters, they are shorter. Between these, however, so many intermediate forms are found that it appears quite impossible to recognise more than one species. *Ph. fulva* and the intermediate forms are therefore considered varieties of *Ph. bicolor*.

Var. *a* (*Phyllorhina fulva*).

Hipposideros fulvus *et* murinus, *Gray, May. Zool. & Bot.* ii. p. 492 (1838).
Rhinolophus murinus *et* fulgens, *Elliot, Catal. Mammals South Mahratta Country*, p. 8 (1840).
Hipposideros fulvus, murinus, atratus, *Kelaart, Prodr. Faunæ Zeylanicæ*, pp. 15, 16 (1852).
Hipposideros cineraceus, *Blyth, Journ. Asiat. Soc. Beng.* xxii. p. 410; *Jerdon, Mammals of India*, p. 28 (1867).
Phyllorhina aurita, *Tomes, P. Z. S.* 1859, pl. 76.
Chrysonycteris fulva, *Gray, P. Z. S.* 1866, p. 82.
Phyllorhina fulva, *Peters, MB. Akad. Berl.* 1871, p. 322; *Dobson, Monogr. Asiat. Chiropt.* p. 71 (1876).

Ears longer than the head, with a very slight flattening of the upper third of the outer margin beneath the broadly rounded-off extremity of the conch (Plate IX. fig. 10).

Thumb and feet slightly longer than in typical specimens of *Ph. bicolor*, and the extremity of the tail appears to project more. In other respects quite similar to *Ph. bicolor*.

In some specimens of this variety the fur is brilliant golden yellow, the brightness of the colour probably unequalled by that of any other species of mammal; in others (by far the greater number) the colour of the fur is white, with dark-coloured extremities. The conditions under which this remarkable difference in colour occurs are not yet understood; but it most probably takes place during the rutting-season, and may be analogous to the breeding-plumage of birds.

(For measurements see Table, p. 150).

Hab. The continental parts of the Oriental Region; India, Ceylon, Burma, China (Amoy).

It is probable that typical examples of *Ph. bicolor*, with ears as long as the head, are confined to the insular parts of the Oriental Region, their representatives in the adjoining continent being the large-eared *Ph. fulva*.

Var. β (*Phyllorhina aruensis*).

Hipposideros aruensis, *Gray*, *P. Z. S.* 1858, p. 107.
Hipposideros albanensis, *Gray*, *P. Z. S.* 1866, p. 220.

Ears intermediate in size between those of typical examples of *Ph. bicolor* and *Ph. fulva*, the outer margin of the ear-conch flattened in the upper third, as in *Ph. bicolor*.

Fur, above, very dark brown, almost black on the surface, the basal three fourths of the hairs pale greyish; beneath, greyish brown, slightly darker towards the extremities of the hairs.

(For measurements see Table below.)

Hab. Albany Island, Cape York; Aru Islands.

Var. γ (*Phyllorhina amboinensis*).

Phyllorhina amboinensis, *Peters*, *MB. Akad. Berl.* 1871, p. 323; *Dobson*, *Monogr. Asiat. Chiropt.* p. 72 (1876).
Phyllorhina micropus (*Hutton*), *Peters*, *l. c.* 1872, p. 256; *P. Z. S.* 1872, p. 703.

Ears shorter than the head, smaller than in any of the previously described forms; the frontal sac appears to be quite absent in the female; the interfemoral membrane is also less triangular behind, and the extremity of the tail projects more. However, the three specimens of this form agree so closely in all other respects with *Ph. bicolor*, that it is impossible to consider them as representatives of a distinct species (Plate IX. fig. 11).

(For measurements see Table below.)

Hab. Amboina; peninsula of India.

In the following Table the measurements of *Ph. bicolor* and its varieties are compared. It may be seen that a regular gradation exists in the size of the ears from *Ph. amboinensis* to *Ph. fulva*.

	Length, head and body.	tail.	head.	ear.	forearm.	3rd finger.	5th finger.	tibia.	foot.	Sex.	Habitat.
		"	"	"	"	"	"	"	"		
Ph. amboinensis...	1·7	0·95	0·65	0·6	1·4	2·2	1·8	0·65	0·25	♀	Deccan, India.
Ph. bicolor	1·8	1·2	0·7	0·7	1·55	2·4	1·95	0·7	0·3	♀	Nicobar Islands.
Ph. aruensis	...	0·95	...	0·8	1·5	2·4	2·0	0·65	0·28	♂	Albany Islands.
Ph. fulva.....	1·75	1·15	0·75	0·9	1·55	2·3	1·9	0·65	0·32	♂	Upper Burma.

(*Phyllorhina bicolor*.)

a. ♂ ad., al.	Pinang.	E. I. House Collection.
b. ♀ ad., al.	Nicobar Islands.	G. E. Dobson, M.B. [P.].
c. ad. sk.	Singapore.	A. R. Wallace, Esq. [C.].

d. ad. sk.	Singapore.	Purchased.
e. ad. sk.	Java.	Leyden Museum.
f. ♀ ad., al.	Philippine Islands.	Zool. Soc. Coll.
g. ad. sk.		
	(*Ph. amboinensis.*)	
h. ♂ ad., al.	Lingasugur, Deccan.	G. E. Dobson, M.B. [E.].
	(*Ph. aruensis.*)	
i. ♂ imm. sk. (type).	Aru Islands.	A. R. Wallace, Esq. [C.].
j. ♂ ad. sk.	Albany Island, Cape York.	C. Coxen, Esq. [P.].
	(Type of *Hipposideros albanensis*, Gray.)	
	(*Ph. fulva.*)	
k. ♀ ad., al.	Scinde.	G. E. Dobson, M.B. [P.].
l. ad. sk.	Bombay.	Dr. Leith [P.].
m. ad. sk. (type).	Madras.	Sir Walter Elliot [P.]
n, *o.* ♀ ad., al.	Madras.	T. C. Jerdon, Esq. [P.].
p. ♂ ad., al.	Ceylon.	Mr. Cuming's Coll.
q. ♂ ad., al.	Upper Burma.	G. E. Dobson, M.B. [E.].
r. ad. sk.	Amoy, China.	R. Swinhoe, Esq. [P.].

22. Phyllorhina megalotis.

Phyllorhina megalotis, *Heuglin, Beitr. Fauna Säugeth. N.O.-Afrika*, p. 8 (1861); *Peters, MB. Akad. Berlin*, 1871, p. 329.

Slightly smaller than *Ph. bicolor*, which it resembles very closely in general appearance. The ears are the same length as in the long-eared variety of that species, similarly oval and rounded off above, but they are comparatively narrower and closer together; their inner margins are more regularly convex from the base upwards, and their inner sides are united posteriorly by a distinct band, about one tenth of an inch in height. In the only specimen as yet discovered the nasal membranes have been completely destroyed; but I have no doubt they are generally similar to those of *Ph. bicolor*, as this species evidently belongs to the same section of the genus.

Thumb short, the first phalanx shorter than the metacarpal bone. Wings from the ankles. Tail and interfemoral membrane as in *Ph. bicolor*, the extremity of the tail projecting slightly more than in that species.

Fur, above, white at the base, the terminal third dark brown; beneath, dull buffy white: on the whole, the colour of the fur is very similar to that of most specimens of *Ph. bicolor*.

Upper incisors very small, lower incisors trifid; upper canines much curved forwards, each tooth with a small internal and anterior basal cusp, and a projection near the middle of its posterior concave margin; no minute upper premolar; the teeth, therefore, agree in number with those of *Ph. tridens*.

Length (of an adult ♀), head and body 1″·5, tail 1″·1, head 0″·6, ear 0″·82 × 0″·6, forearm 1″·4, thumb 0″·2; third finger—metacarp. 0″·95, 1st ph. 0″·55, 2nd ph. 0″·6; fourth finger—metacarp. 1″·02, 1st ph. 0″·4, 2nd ph. 0″·3; fifth finger—metacarp. 1″, 1st ph. 0″·45, 2nd ph. 0″·38; tibia 0″·6, foot 0″·28, calcaneum 0″·24.

Hab. North-east Africa (Bogos Land).

Type in the collection of the Stuttgart Museum.

Through the kindness of Dr. Krauss, Director of the Royal Zoological Museum at Stuttgart, I have been enabled to examine the type of this most interesting species, which differs from all other species of the genus in the very distinct union of the ears. But in *Ph. fulva*, which it resembles most closely, a very low band may be traced across the forehead from the base of one ear to the other. The difference, therefore, between these species, in this respect at least, is evidently one of degree only.

5. CŒLOPS.

Cœlops, *Blyth, J. A. S. B.* xvii. p. 251 (1848); *Peters, Wiegm. Archiv*, ii. p. 117 (1862); *MB. Akad. Berl.* 1865, p. 644, and 1871, p. 330; *Dobson, J. A. S. B.* 1872, p. 141; *Monogr. Asiat. Chiropt.* p. 74 (1876).

The horizontal nose-leaf, corresponding to the horseshoe in *Rhinolophus* and *Phyllorhina*, is deeply emarginate on the sides and in front, the anterior lappets covering the bases of two long depending leaflets; a sella behind the nostrils somewhat similar to that in *Phyllorhina*, and behind this a transverse concave-fronted erect terminal leaf supporting a heart-shaped projection in the centre. Ears separate. Metacarpal bone of thumb very long, phalanx short; index finger very long, extending beyond the extremity of the first phalanx of the middle finger; toes, as in *Phyllorhina*, of two phalanges each; tail and calcanea short, interfemoral membrane deeply emarginate.

Dentition. Inc. $\frac{1-1}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

The general form of the skull and teeth is very similar to that of *Phyllorhina*. The base of the skull is almost quite similar, and the nasal bones are similarly developed. This genus, therefore, though presenting such remarkable differences in the form of the nasal appendages, stands most nearly related to *Phyllorhina*.

1. Cœlops frithii.

Cœlops frithii, *Blyth, l. c.*; *Peters, MB. Akad. Berl.* 1871, p. 331; *Dobson, l. c.*

Cœlops bernsteinii, *Peters, Wiegm. Archiv*, ii. p. 117 (1862); *MB. Akad. Berl.* 1865, p. 645.

Ears funnel-shaped, as in the genus *Kerivoula* (Vespertilionidæ): the outer side of the ear-conch nearly as deep as the inner, the whole surface of the conch thickly clothed with fine hairs. The nasal appendages as described above; the sides of the horizontal membranes almost concealed by long fine hairs, with which the face is thickly covered; behind the terminal transverse leaf a circular frontal pore, quite similar to that found in some species of *Phyllorhina* (Plate VIII. fig. 6).

Thumb included in the wing-membrane almost to the base of

the claw. Wings to the tarsus close to the ankles; feet very slender, toes with strong claws; calcanea and tail very short; the interfemoral membrane deeply angularly emarginate on a line with the knee-joints.

Fur shining brown above and beneath, the bases of the hairs much paler.

First upper premolar minute, in the tooth-row; canine with a prominent talon behind and a smaller one in front, near its summit.

Length (of an adult ♂ in the collection of the Leyden Museum), head and body 1″·7, interfemoral membrane in the middle 0″·3, ear 0″·52, forearm 1″·6, index finger 1″·7; third finger—metacarp. 1″·2, 1st ph. 0″·3, 2nd ph. 1″; fourth finger—metacarp. 1″·25, 1st ph. 0″·4, 2nd ph. 0″·48; fifth finger—metacarp. 1″·35, 1st ph. 0″·4, 2nd ph. 0″·5; tibia 0″·65, foot 0″·35.

Hab. Bengal Sandarbans; Java.

The only specimens of this very remarkable species yet obtained are the type, a skin in bad condition in the collection of the Indian Museum, Calcutta, and an adult male (the type of *C. bernsteinii*, Peters) preserved in alcohol in the Leyden Museum. I have examined both specimens, and have no hesitation in referring them to the same species.

Family NYCTERIDÆ.

Megadermata, *Peters* (in part), *MB. Akad. Berl.* 1865, p. 256.
Rhinolophidæ, *Gray* (in part), *P. Z. S.* 1865, pp. 81–83.
Nycteridæ, *Dobson, Ann. & Mag. Nat. Hist.* 1876, xvi. p. 347; *Monogr. Asiat. Chiropt.* p. 75 (1876).

Bats with distinct cutaneous appendages margining the apertures of the nostrils, which are situated on the upper surface of the muzzle; with large united ears, with well-developed tragi; with pectoral, not axillary mammæ; with two phalanges in the middle finger, whereof the first is extended (in repose) in a line with the metacarpal bone, and with or without a short phalanx in the index finger; with long tibiæ, but the fibulæ rudimentary or absent.

Premaxillary bones cartilaginous or small; upper incisors absent, or very small in the centre of the space between the canines; molars well developed, with acute W-shaped cusps.

Range. Ethiopian and Oriental Regions*.

* One species, *Megaderma spasma*, extends slightly beyond the limits of the Oriental Region (as defined by Mr. Wallace), being found in Celebes and in Ternate, and *Nycteris thebaica* occurs as far north as Egypt.

Subfam. I. MEGADERMINÆ.

Nostrils at the bottom of a concavity near the extremity of the muzzle, concealed by the base of an erect cutaneous process; tail very short, in the base of the large interfemoral membrane; premaxillaries cartilaginous.

1. MEGADERMA.

Megaderma, *Geoffroy, Annal. du Mus.* xv. p. 197 (1810); *Peters, MB. Akad. Berl.* 1872, p. 192; *Dobson, Monogr. Asiat. Chiropt.* p. 75 (1876).

Megaderma *et* Lavia, *Gray, Mag. Zool. & Bot.* ii. p. 490 (1838); *P. Z. S.* 1866, p. 83.

Muzzle cylindrical, elongated; nostrils in a slight depression at the extremity of the upper surface of the muzzle, surrounded by a naked cutaneous expansion, which forms a vertical process posteriorly, and anteriorly is attached to or projects slightly beyond the extremity of the muzzle; lower lip projecting slightly beyond the upper; ears large, conjoined by part of their inner margins; tragus long, bifid; wings ample, cutaneous system greatly developed throughout; a single very short bony phalanx in the index finger; fourth and fifth metacarpal bones progressively longer than the third; tibia very long; toes nearly equal in length; outer or first toe with two, the remaining toes with three phalanges each; calcaneum distinct; tail very short (of four or five very small but distinct vertebræ), not discernible except in skeletons; interfemoral membrane large, concave behind; a pair of pubal appendages as in *Rhinolophus*.

Dentition. Inc. $\frac{0}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$ or $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

The first upper premolar small or absent; last molar less than half the antepenultimate molar. Skull much narrowed in front, so that the posterior molars of opposite sides are much further apart than the canines; bony palate not extending backwards beyond the last molar; zygomatic arches very wide; frontal bones flattened and slightly expanded laterally; the base of the postorbital process perforated by a small foramen; the infraorbital foramen converted into a long canal, opening anteriorly near the second premolar.

Range. Ethiopian and Oriental Regions, one species extending also into part of the Australian Region.

This genus includes a few species of Bats of very peculiar aspect, presenting in their general conformation scarcely any affinities with the species of any other genus. The absence of upper incisors, the cylindrical narrow muzzle, the very peculiar nose-leaf and immense connate ears with large bifid tragi, the remarkably large eyes (more like those of the frugivorous Bats), and the apparent absence of the tail, at once distinguish the genus.

The colour of the fur and membranes (a light slaty blue) is also very characteristic, and scarcely varies in the different species. The

presence near the pubis of a pair of peculiar teat-like appendages connects this genus with the Rhinolophidæ.

Mr. Blyth has shown * that one species at least of the genus (*M. lyra*) occasionally feeds on other than insect prey, as he had taken a specimen in the act of sucking the blood, while flying, from a smaller species of Bat, which it afterwards devoured. The very peculiarly shaped, elongated, narrow muzzle, and large trenchant canines, with acutely pointed basal cusps, of this and of the other species of *Megaderma*, and the projecting mandible, so different from all insectivorous Bats, naturally lead us to suspect corresponding differences in habits. It is highly probable that all the species of this genus do not confine themselves to insect prey alone, but also feed, when they can, upon the smaller species of Bats and other small mammals. I have examined the stomachs and intestines of a great number of specimens of *M. lyra*, but have invariably found them either quite empty or partially filled with pultaceous matter, in which I have not been able to distinguish the remains of insects; but Hodgson found insects in the stomachs of specimens of this species which he obtained in Nipal, and Jerdon states that it has also been known to eat frogs and fish.

Synopsis of Subgenera and Species.

(See Plate X.)

I. Premolars $\frac{2-2}{2-2}$; frontal bones slightly flattened, with or without small postorbital processes. (Oriental Region.)

a. Base of the central longitudinal crest of the nose-leaf expanded above, cordiform; no post-orbital processes. (Subgen. *Megaderma*, Ptrs.) 2. *M. spasma*, p. 157.

b. Base of the central longitudinal crest of the nose-leaf circular; postorbital processes small. (Subgen. *Lyroderma*, Ptrs.) ..... 1. *M. lyra*, p. 156.

II. Premolars $\frac{1-1}{2-2}$; frontal bones much flattened, with more or less large postorbital processes. (Ethiopian Region.)

c. Base of the central longitudinal crest of the nose-leaf expanded, cordiform; frontal bones considerably flattened and grooved, with well-developed postorbital processes. (Subgen. *Cardioderma*, Ptrs.) ..... 3. *M. cor*, p. 159.

d. Base of the central longitudinal process irregularly quadrate; centre of the anterior margin of the horizontal leaf bent upwards, forming a prominent projection in front; frontal bones much flattened and grooved, with large post-orbital processes. (Subgen. *Lavia*, Gray).... 4. *M. frons*, p. 159.

As the above Synoptical Table shows, the species inhabiting the

* In a paper "On the Sanguivorous and Predaceous Habits of the Bats of the Genus *Megaderma*," Journ. Asiat. Soc. Bengal, xi. pp. 255, 256. *Vide* my 'Monograph of the Asiatic Chiroptera,' p. 77 (1876).

Ethiopian Region differ from those of the Oriental in the absence of the minute first upper premolar, and in the shape of the frontal and nasal bones. Prof. Peters has pointed out* that, although *M. cor* resembles *M. spasma* in the form of the nose-leaf, yet it is closely connected with *M. frons*, not only by the absence of the first upper premolar, but also in the greatly flattened and expanded frontal and nasal bones, terminating laterally in broad postorbital processes as in the genus *Nycteris*. *M. frons* is readily distinguished externally from all the other known species of the genus by the much greater size of the nose-leaf and its free front margin.

1. Megaderma lyra.

Megaderma lyra, *Geoffroy, Ann. du Mus.* xv. p. 190 (1810); *Blainville, Ostéographie* (1839); *Blyth, Journ. Asiat. Soc. Beng.* xi. (1842), p. 254, xiii. p. 480 (1844), xx. p. 156 (1851); *Wagner, Suppl. Säugeth.* v. p. 641 (1855); *Dobson, P. A. S. B.* 1872, p. 208; *Monogr. Asiat. Chiropt.* p. 78 (1876), figs. *a*, *b*; *Peters, MB. Akad. Berl.* 1872, p. 195.

Vespertilio (Megaderma) carnatica, *Elliot, Madras Journ. Sci.* x. p. 5 (1839).

Megaderma spectrum, *Wagner in Hügel's Kashmir*, p. 570 (1844); *Suppl. Schreb. Säugeth.* v. p. 641 (1855).

Megaderma schistacea, *Hodgson, J. A. S. B.* xvi. p. 889 (1847).

Muzzle long and cylindrical, the lower jaw projecting beyond the upper. Ears considerably longer than the head, conjoined for nearly half the length of the inner margin, oval, broadly rounded-off above, outer and inner margins slightly convex, the outer margin terminating abruptly midway between the base of the tragus and the angle of the mouth; tragus very large, bifid, the posterior portion long, narrow, and acutely pointed, tapering towards the tip, the anterior part scarcely half the length, broad, with rounded summit continuous with its convex anterior margin. Nose-leaf long, narrow, truncate above, with straight not converging sides; its horizontal base circular, with a free margin, forming a concave disk above the extremity of the muzzle, with the openings of the nostrils at the bottom of the concavity; its anterior surface with a prominent central longitudinal ridge, corresponding to a deep groove on the posterior surface of the leaf, expanded below into a circular disk, the margins of which conceal the nasal apertures. The projecting lip has a prominent triangular naked space in front, divided by a longitudinal groove (Plate X. fig. 2).

Wing-membrane *from the back of the foot*, attached close to the base of the outer toe, or from the space between the outer toe and the second toe; interfemoral membrane large, square behind; calcaneum short, feeble; the very short tail concealed within the base of the interfemoral membrane.

Fur long and straight, of a peculiar slaty blue colour, paler on the ventral surface.

* MB. Akad. Berl. 1873, p. 488.

The membranes are almost naked, but the fur of the body extends upon the humerus and muscular part of the forearm very densely.

First upper premolar very small and internal, partially covered by the expanded cingulum of the large second premolar, which has a distinct anterior and posterior basal cusp; the upper canine, on each side, has a very distinct acutely pointed internal basal cusp, which appears in recent specimens like an incisor, and also a large but less acute posterior cusp. The four lower incisors are equal in vertical extent, bifid, and, although close together, not crowded.

Frontal bones flattened and slightly expanded laterally, with very short postorbital processes (Plate X. fig. 2*a*).

Dentition. Inc. $\frac{0}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Length, head and body 3″·4, ear 1″·7, tragus 0″·7, nose-leaf 0″·55, forearm 2″·7, third finger 4″·7, fifth finger 3″·1, tibia 1″·4, foot 0″·65.

A specimen in the writer's collection, sent from Mangalore, Malabar coast of India, by Dr. A. F. Dobson, has the terminal third of the fur above pale greyish brown, beneath almost white; ears, nose-leaf, and membrane of the same pale colour. That this is not due to age is shown by the unworn condition of the teeth. It is also slightly smaller than adult specimens of *M. lyra* from other parts of India, but does not differ from them structurally so far as can be seen. The following are the measurements of this specimen:—

Length, head and body 3″·2, head 1″·2, ear 1″·55, tragus 0″·7, nose-leaf 0″·55, forearm 2″·5; third finger—metacarp. 1″·75, 1st ph. 1″·1, 2nd ph. 2″; fourth finger—metacarp. 1″·9, 1st ph. 0″·6, 2nd ph. 0″·85; fifth finger—metacarp. 2″·15, 1st ph. 0″·75, 2nd ph. 0″·65; tibia 1″·25, calcaneum 0″·45, foot 0″·65.

Hab. Peninsula of India (from Kashmir to Cape Comorin); Ceylon.

a. ad. sk.	Nipal, Himalayas.	B. H. Hodgson, Esq. [P.].
b. ♂ ad., al.	India.	General Hardwicke [P.].
c. ad. sk.	Bombay.	Dr. Leith [P.].
d–f. ad. sk.	Madras.	Sir Walter Elliot [P.].
g, h. ♂ ad., al.	Madras.	T. C. Jerdon, Esq. [P.].
i–m. ad. sk.	Java?	E. I. Company [P.].
n. ad. sk.		Old Collection.
o. ad. sk.		
p. ad. sk.		
q. ♀ ad., al.		Old Collection.
r–x. skull.	Nipal.	B. H. Hodgson, Esq. [P.].
y–c'. skulls.	Madras.	Sir Walter Elliot [P.].
d'. skeleton.		

2. Megaderma spasma.

Vespertilio spasma, *Linnæus, Syst. Nat.* 1758, p. 32; *Schreber, Säugethiere*, i. p. 158, pl. xlviii. (1775).

Megaderma spasma, *Geoffroy, Ann. du Mus.* p. 195 (1810); *Cantor, Journ. Asiat. Soc. Beng.* 1846, p. 179; *Blyth, Append. Kelaart's*

Prodr. Faunæ Zeylanicæ, p. 38 (1852); *Peters, MB. Akad. Berl.* 1872, p. 193; *Dobson, Monogr. Asiat. Chiropt.* p. 79 (1876).
Megaderma trifolium, *Geoffroy, l. c.* p. 193; *Wagner, Suppl. Schreb. Säugeth.* i. p. 415 (1844), v. p. 642 (1855).
Megaderma philippinensis, *Waterhouse, P. Z. S.* 1843, p. 69.
Megaderma horsfieldii, *Blyth, Catal. Mammal. Mus. Asiat. Soc. Beng.* p. 23 (1863).

Smaller than *M. lyra*, which it resembles in the form of the muzzle and ears; the posterior portion of the tragus is, however, longer and more attenuated upwards, and more acutely pointed; the nose-leaf is shorter, with convex sides, but the anterior concave disk is considerably larger, its external margin is thickened and adherent to the muzzle beneath, and the base of the narrow longitudinal process is cordate (Plate X. fig. 1).

Thumb and wings quite similar to those of *M. lyra*; but the interfemoral membrane is deeper, the calcanea stronger, and the wing-membrane does not extend so far down upon the foot. Colour and distribution of the fur as in *M. lyra*.

First upper premolar larger than in *M. lyra*; in other respects the teeth are similar in both species.

The skull differs much from that of *M. lyra* and from the other species of the genus in the narrow unexpanded frontals, and in the complete absence of postorbital processes; the mesopterygoid fossa is divided longitudinally by a very well-marked ridge (Plate X. figs. 1*a*, 1*b*).

Length, head and body 3″·4, ear 1″·3, tragus 0″·8, forearm 2″·3, thumb 0″·6, third finger 4″, fifth finger 3″·1, tibia 1″·25, foot 0″·6.

Hab. Malay Peninsula (Malacca); Siam; Philippine Islands, Ternate, Celebes, Sumatra, Java, ? Ceylon.

This is the only species of the genus extending into the Australian Region, but it has been found only in those parts of that region adjoining the Oriental Region, the avifauna of which shows a large admixture of species from Java and Borneo with Australian forms. The occurrence of this species in Ceylon is doubtful, for no specimens from that locality are found in any of the museums. Mr. Blyth has, however, stated that he had compared specimens from Ceylon with those from Malacca and Java*; and his short description of the form of the nose-leaf certainly agrees with the characters of *M. spasma*.

a. ♂ ad., al.	Ceylon ?	Purchased.
b. ad. sk.	Pinang.	
c. ad. sk.	Singapur.	
d. ♂ ad., al.	Siam.	Purchased.
e. ad. sk.	Java.	Purchased.
f–h. ad. sk.	Java.	

* The specimens from Malacca and Java referred to by Mr. Blyth (Kelaart, Prodr. Faunæ Zeylanicæ, pp. 36, 38) are still preserved in the collection of the Indian Museum, Calcutta, and are undoubtedly referable to this species.

i. ♂ ad., al.	Borneo.	L. L. Dillwyn, Esq. [P.].
j. ♂ ad., al.	North Celebes.	Purchased.
k. ♂ ad., al.	Philippine Islands.	Zool. Soc. Coll.
l. ♂ ad., al.	Luzon.	Dr. Meyer [C.].
m, n. ♂ juv. & ♀ ad., al.	Philippine Islands.	
o. ad. sk.	Ternate.	A. R. Wallace [C.].
p-t. ad. sk.		E. I. House Coll.
u. ♀ ad., al.		Sir A. Smith [P.].
v. ad. sk.	No history.	
w. skeleton.	Java.	Purchased.
x. skull of *n*.		

3. Megaderma cor.

Megaderma cor, *Peters, MB. Akad. Berl.* 1872, p. 194.

Nose-leaf generally similar to that of *M. spasma*, but the front margin is longer, and the terminal leaf is rounded above, not truncated as in that species, and clothed with fine hairs as in *M. frons*. Ears somewhat longer than in *M. spasma*, but similar in general form. The tragus is peculiar: the anterior lobe quadrate, not broadly sickle-shaped and terminating above in a point, but the upper margin is concave and separated from the outer convex margin by a small projection only.

The foot is much larger, and the calcaneum shorter than in *M. spasma*.

Colour of the fur as in *M. lyra*. Muzzle and chin clothed with rather long stiff hairs.

Frontal bones flattened and grooved, with well-developed post-orbital processes, resembling in this respect *M. frons* rather than *M. spasma*.

Dentition. Inc. $\frac{0}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

Length, head and body 3″·2, head 1″·1, ear 1″·55, tragus 0″·7, nose-leaf 0″·55 × 0″·28, forearm 2″, thumb 0″·6, third finger 3″·6, fifth finger 2″·8, tibia 1″·1, calcaneum 0″·3, foot 0″·7.

Hab. Africa (Abyssinia; Mombaça).

Type in the collection of the Berlin Museum. The above has been taken from Dr. Peters's original description of this species, founded on a single adult male specimen, which I have not seen.

4. Megaderma frons.

Megaderma frons, *Geoffroy, Ann. du Muséum*, xv. p. 192 (1810) *Wagner, Suppl. Schreb. Säugeth.* i. p. 414 (1844), v. p. 643 (1853); *Peters, MB. Akad. Berl.* 1859, p. 223, 1872, p. 196.
Lavia frons, *Gray, Mag. Zool. & Bot.* ii. p. 490 (1838).

Muzzle as in *M. lyra*, but more obtuse in front, and the lower lip has no naked prominences separated by a longitudinal groove. Ears very large, larger than in any of the other species of the genus, united by a deep band; tragus longer than the head, tapering evenly to a very fine point, the anterior lobe not half its length,

but nearly equal to it in breadth, also acutely pointed and clothed with soft hair. Nose-leaf very large, nearly as long as the head, slightly convex on the sides, abruptly truncated above, the anterior portion with an expanded thin free margin, forming a narrow, but considerably elevated, fold in the centre; nostrils, as in the other species, at the bottom of a deep concavity, concealed by the expanded base of a central longitudinal crest, somewhat similar in shape to that of *M. lyra*, but much larger. The posterior erect portion of the leaf covered with fine hairs (Plate X. fig. 3).

Fur above and beneath deep slate-blue.

Wing-membrane from the back of the foot from the space between the bases of the first and second toes; interfemoral membrane and calcaneum as in *M. lyra*.

Frontal bones deeply grooved, much flattened and expanded laterally, forming large postorbital processes as in the genus *Nycteris* (Plate X. fig. 3*a*). The cartilaginous premaxillary bones more developed than in any of the other species (fig. 3*b*).

Length, head and body 2″·6, interfemoral membrane 1″·8, head 1″, ear 1″·65, nose-leaf 0″·9, tragus 1″·05, forearm 2″·2, thumb 0″·45, third finger 4″·1, fifth finger 3″, tibia 0″·6, foot 0″·6.

Hab. Tropical parts of West and East Africa, from the coast of Guinea to Abyssinia and Zanzibar.

The only information we possess on the habits of this species (which differs so remarkably in structure from all the other species of this genus) is contained in the following note by Capt. J. H. Speke:—"This Bat was shot flying at Meninga. They were numerous, but rose singly from the ground, and alighted sometimes in the bushes, sometimes again in the grass"*.

This appears to indicate that *M. frons* hunts for its prey by day as well as by night; and the large size of the eyes in this as well as in the other species of *Megaderma* leads us to consider this very probable. Mr. Blyth has shown that *M. lyra* feeds on grasshoppers and small Bats (and probably on other small animals); and the individuals of *M. frons* observed by Capt. Speke may have been engaged in hunting for grasshoppers and small mammals among the long grass.

a–d. ad. sk.	Gambia.	
e. ad. sk.	Clan Nil (?).	Purchased.
f. ♂ ad., al.	Khartoum.	Purchased.
g, h. ♀ (juv. et ad.) al.	W. Africa.	Mr. Fraser's Collection.
i, j. ♀ ad., al.	Dar-es-Salam.	Dr. Kirk [C.].
k. sk.		
l. skeleton.		Purchased.
m. skull of *j*.		
n. skull.	Cape Coast Castle.	F. Williams, Esq. [P.].

* P. Z. S. 1864, p. 99.

Subfam. II. NYCTERINÆ.

Nostrils at the anterior extremity of a deep longitudinal facial groove; tail long, produced to the hinder margin of the interfemoral membrane.

2. NYCTERIS.

Nycteris, *Geoffroy, Desmarest, Nouv. Dict. d'Hist. Nat.* xv. p. 501 (1803); *Descript. de l'Egypte*, ii. p. 113 (1812); *Peters, MB. Akad. Berl.* 1870, p. 900.
Nycteris *et* Petalia, *Gray, Mag. Zool. & Bot.* ii. p. 494 (1838).
Nycteris, *et* Nycterops *et* Pelatia, *Gray, P. Z. S.* 1866, p. 83.

Muzzle cylindrical as in *Megaderma*, but shorter, and the lower lip has a wart in front, with two much larger naked prominences below; the lower lip also slightly projects beyond the upper; face deeply grooved longitudinally, the sharp-edged groove extending from the nostrils (which are on the upper surface of the muzzle near its extremity) to the lower band connecting the bases of the ears; the posterior half of this groove is wider and more depressed than the anterior, and its floor is divided by a very slightly elevated, narrow, longitudinal ridge; the sides of the depression are margined as far back as the eyes by small horizontal cutaneous appendages; ears large, united by a low band, which in some species is scarcely developed; eyes small.

Index finger consisting of the metacarpal bone alone; fourth and fifth metacarpal bones longer than the third; wings ample, from the base of the toes; tail long, the terminal caudal vertebra ⊤-formed; no fibula; mammæ pectoral, not axillary.

Dentition. Inc. $\frac{4}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

Upper incisors small, chisel-shaped, bifid or trifid, equal in vertical extent, and close together in the centre of the space between the canines (Plate XI. fig. 1, incisors of *Nycteris hispida*); second lower premolar smaller than the first, often minute and internal to the tooth-row. The frontal bones greatly expanded and flattened, much more so than in *Megaderma*, and grooved by a deep depression (Plate XI. fig. 2, skull of *Nycteris javanica*).

Range. Ethiopian and Oriental Regions (in the latter Region as yet recorded from the Malay Peninsula and Java only). *Nycteris thebaica* extends slightly beyond the limits of the Ethiopian Region.

Although the species of this genus differ very considerably from those of the genus *Megaderma* in the form of the nose-leaf and in the great length of the tail, the affinity of the two genera is shown by the peculiar form of the frontal bones, which are almost similarly grooved and expanded (though in a less degree) in *Megaderma frons* as in the species of *Nycteris*, also by the form and structure of the ears, and by the great development of the integumentary system.

In general structure *Nycteris* approaches the *Rhinolophidæ* more

closely than *Megaderma*, and even agrees with the species of the genus *Rhinolophus* in the small size of the second lower premolar, and in the general form of the molar teeth. The position and size of the second lower premolar has been used to distinguish the species; but, as I have shown in the genus *Rhinolophus* (p. 114), this character cannot be relied upon except when taken in connection with other peculiarities of structure. The form of the tragus, the size of the ears, and the dental characters must be considered together in distinguishing the species of this genus, which, unlike those of *Megaderma* and *Rhinolophus*, show no appreciable differences in the form of the cutaneous nasal appendages.

Synopsis of the Species.

A. The tragus reaches its greatest width opposite the base of its inner margin.
  a. Inner margin of the tragus concave.
    a'. Upper incisors trifid; ears scarcely longer than the head.
      a''. Second lower premolar minute, in the tooth-row; forearm 1½ inch ..... 1. *N. hispida*, p. 162.
      b''. Second lower premolar one third the size of the first; forearm 2¼ inches .. 2. *N. grandis*, p. 164.
    b'. Upper incisors bifid; ears considerably longer than the head.
      c''. Second lower premolar two thirds the size of the first, in the tooth-row .... 3. *N. javanica*, p. 164.
      d''. Second lower premolar minute, half internal to the tooth-row ..... 4. *N. æthiopica*, p. 165.

B. Tragus expanded above, reaching its greatest width opposite the middle of its inner margin; ears much longer than the head.
  b. Inner margin of the tragus straight.
    c'. Upper incisors bifid.
      e''. Second lower premolar minute, half internal to the tooth-row ..... 5. *N. macrotis*, p. 165.
  c. Inner margin of the tragus convex.
    d'. Upper incisors bifid.
      f''. Second lower premolar minute, quite internal to the tooth-row ..... 6. *N. thebaica*, p. 165.
      g''. Second lower premolar minute, in the tooth-row ..... 7. *N. capensis*, p. 166.

1. Nycteris hispida.

Vespertilio hispidus, *Schreber, Säugeth.* i. p. 169, pl. lvi. (1775).
Nycteris daubentonii, *Geoffroy, Descr. de l'Egypte*, p. 113 (1812) (vide *Peters, MB. Akad. Berl.* 1870, p. 901).
Rhinolophus martini, *Fraser, P. Z. S.* 1843, p. 25.
Nycteris poensis, *Gray* (nomen nudum), *Catal. Mammal. Brit. Mus.* p. 24 (1843).
Nycterops pilosa, *Gray, P. Z. S.* 1866, p. 83.
Nycteris hispida, *Peters, l. c.* pl. figs. 1, 2.

Ears slightly longer than the head, oval, rounded off above; inner and outer margins of the ear-conch convex, at the base of the outer margin a small erect lobe; tragus small, curved inwards and forwards, narrowed above, extremity rounded, inner margin concave. The surface of the ear-conch is thickly studded with glandular elevations from which small hairs arise, and the tragus is covered with long hairs. On the face the posterior cutaneous leaflets margining the longitudinal groove are covered with hair, which also conceals the deep frontal cavity. The sides of the muzzle in front are covered with erect hairs. The fur of the back extends thickly upon the humerus and fleshy part of the forearm, and upon the wing-membrane as far as a line drawn from the elbow to the knee; the anterior one third of the interfemoral membrane is thinly covered.

Fur and integuments dark brown or black, the extremities of the hairs paler.

Upper incisors short, broad, and trifid; lower incisors trifid, slightly crowded; the single upper premolar large and close to the canine; the second lower premolar minute, in the tooth-row, varying slightly in size.

Length (of an adult ♀), head and body 1″·8, tail 1″·85, head 0″·7, ear 0″·85, tragus 0″·25 × 0″·14, forearm 1″·6, thumb 0″·4, third finger 2″·9, fifth finger 2″·2, tibia 0″·8, foot 0″·35.

Hab. That part of the Ethiopian Region which is included within the continent of Africa.

a. ♂ & ♀ ad., al.	Northern Africa.	Purchased.
b. ♀ ad., al.	Khartoum.	F. Petherick, Esq. [C.].
c. ad. sk.	Fernando Po Island. (Type of *Nycteris poensis*, Gray.)	Capt. E. Downes, R.N. [P.].
d. ♀ ad., al.	Fernando Po Island.	Zool. Soc. Coll.
e. ♀ ad., al.	Old Calabar.	Dr. J. A. Smith [P.].
f. ♂ ad., al.	Old Calabar.	Dr. J. A. Smith [P.].
g. ♂ ad., al.	Old Calabar.	Purchased.
h. ♂ ad., al.	Lagos.	Purchased.
i. ♂ imm., al.	Angola.	Dr. J. E. Gray [P.].
j. ♀ ad., al.	Zanzibar.	Dr. Kirk [P.].
k. ♀ ad., al.	Cape of Good Hope.	Sir A. Smith [P.].
l. ♀ ad., al.	No history.	

Var. *a*.

Nycteris villosa, *Peters, Reise nach Mossambique, Säugeth.* p. 48, pl. xi. (1852); *MB. Akad. Berl.* 1870, p. 902, pl. fig. 3 (teeth).

Distinguished from *N. hispida*, according to Dr. Peters, by the more extended distribution of the fur upon the volar membranes, and by the greater size of the second lower premolar.

Hab. South-east Africa (Inhambane).

Type in the collection of the Berlin Museum.

2. Nycteris grandis.

Nycteris grandis, *Peters, MB. Akad. Berl.* 1865, p. 358; 1870, p. 906.

Considerably larger than any other known species of the genus, but in the form of the ears and tragus, in the trifid upper incisors, and even in the colour and distribution of the fur agreeing with *N. hispida*. The lower jaw projects to a greater extent than even in *N. javanica*, and the second lower premolar, though not so large as in that species, is nearly one third the size of the first premolar, and is not crushed in between the adjoining teeth, but stands in the centre of the tooth-row.

Length (of an adult ♀), head and body 2″·8, tail 2″·9, head 1″, ear 1″·2, tragus 0″·3×0″·14, forearm 2″·25, thumb 0″·7; third finger—metacarp. 1″·7, 1st ph. 1″·15, 2nd ph. 1″·4; fifth finger—metacarp. 1″·9, 1st ph. 0″·65, 2nd ph. 0″·65; tibia 1″·25, calcaneum 0″·9, foot 0″·56.

Hab. West Africa (Accra, Gold Coast; coast of Guinea).

a. ♂ ad., al. Purchased.

3. Nycteris javanica.

Nycteris javanicus, *Geoffroy, Ann. du Muséum*, xx. p. 20 (1813).
Petalia javanica, *Gray, Mag. Zool. & Bot.* ii. p. 494 (1838).
Nycteris javanica, *Peters, MB. Akad. Berl.* 1870, p. 906, figs. 9, 9 *a* (tragus and teeth); *Dobson, Monogr. Asiat. Chiropt.* p. 81 (1877).

Ears as in the preceding species, but proportionately larger; tragus also similar, slightly broader. The lower jaw projects beyond the upper, and the second lower premolar is nearly two thirds the size of the first, and stands in the centre of the tooth-row. Upper incisors bifid.

The fur of the body extends to a less distance outwards upon the membranes than in *N. hispida*. The colour varies, but appears to be generally bright reddish brown above, and a paler shade of the same beneath.

Length (of an adult ♀), head and body 2″·3, tail 2″·45, head 0″·85, ear 1″·1, tragus 0″·25×0″·14, forearm 1″·8, thumb 0″·6, third finger 3″, fifth finger 2″·7, tibia 0″·95, calcaneum 0″·75, foot 0″·45.

Hab. Java; Malay Peninsula (Malacca*).

Nycteris javanica is the only species of the genus as yet discovered beyond the limits of the continent of Africa. It is distinguished from all the other species by the large size of the second lower premolar, and by the bright reddish-brown colour of the fur.

a. ad. sk.	Java.	Leyden Museum.
b, *c*. ad. sks.	Java.	Purchased.
d. imm. sk.	Java.	E. I. House Collection.
e. ad. sk.	Timor.	Purchased.
f. ♀, al.		Purchased.
g. skull of *e*.		
h. skeleton.		Purchased.

* This locality depends on the authority of Mr. Blyth (*vide* Catal. Mammal. Mus. As. Soc. Beng. 1863, p. 28).

4. Nycteris æthiopica.

Ears as in *N. javanica*, but the tragus is narrower and more curved inwards (Plate XI. fig. 3).

Fur, above, brown, paler at the base of the hairs; beneath, the chest and abdomen vary in colour from yellowish white to pure snow-white.

Upper incisors bifid; the second lower premolar as large as in *N. hispida*, standing in the tooth-row, but drawn half inwards.

Length, ear 1″·15, thumb 0″·6; third finger—metacarp. 1″·4, 1st ph. 1″, 2nd ph. 1″·15; fourth finger—metacarp. 1″·5, 1st ph. 0″·55, 2nd ph. 0″·5; fifth finger—metacarp. 1″·55, 1st ph. 0″·55, 2nd ph. 0″·6; tibia 0″·85, foot 0″·45.

Hab. N.E. Africa (Kordofan; Senaar).

a. ad. sk. (type).	Kordofan.	Purchased.
b, *c*. ad. sk.	Kordofan.	Purchased.
d. ad. sk.	Senaar.	Purchased.
e. skull of *d*.		

5. Nycteris macrotis.

Nycteris macrotis, *Dobson, Monogr. Asiat. Chiropt.* p. 80 (1876).

Ears much longer than the head; tragus (Plate XI. fig. 4) quite different in shape from that of any other species; the outer margin convex, reaching its greatest convexity opposite the base of the inner margin, the convexity very slightly diminishing upwards; inner margin perfectly straight.

Fur, above, dark brown; beneath, greyish brown.

Second lower premolar minute, half internal to the tooth-row.

Length, head and body 2″·25, tail 2″·4, head 0″·85, ear 1″·4, tragus 0″·3 × 0″·18, forearm 1″·9, thumb 0″·5, third finger 3″·6, fifth finger 2″·8, tibia 0″·95, calcaneum 0″·75, foot 0″·4.

Hab. West Africa (Sierra Leone).

a. ♂ ad., al. (type).	Sierra Leone.	Purchased.
b. ♂ ad., al.	No history.	

6. Nycteris thebaica.

Nycteris thebaicus, *Geoffroy, Descr. de l'Egypte*, ii. p. 119, pl. i. no. 2 (1812).

Nycteris geoffroyi, *Desmarest, Mammalogie*, p. 128 (1820).

Nycteris thebaica *et* albiventer, *Wagner, Suppl. Schreb. Säugeth.* i. pp. 438, 439 (1844).

Nycteris thebaica, *Wagner, op. cit.* v. p. 645 (1855); *Peters, MB. Akad. Berl.* 1870, p. 903.

Nycteris labiata, *Heuglin, Nova Acta Acad. Leop.-Carol. Nat. Cur.* xxix. p. 5 (1861) (vide *Peters, l. c.*).

Nycteris angolensis, *Peters, l. c.*

Ears much longer than the head, but shorter than in the preceding species; tragus expanded above, reaching its greatest width

about the middle of its inner margin; outer margin convex in its upper half, the inner margin similarly convex throughout (Plate XI. fig. 5). (The form of the tragus is therefore quite different from that of any of the previously described species.)

Fur varying in colour from dusky brown above and greyish brown beneath to pale reddish brown on the upper surface, with the whole breast and abdomen pure white.

Second lower premolar minute, quite internal to the tooth-row.

Length (of an adult ♀), head and body 2″, tail 2″·2, head 0″·8, ear 1″·2, tragus 0″·3×0″·18, forearm 1″·75, thumb 0″·5, third finger 3″·45, fifth finger 2″·55, tibia 0″·9, calcaneum 0″·65, foot 0″·4.

Hab. Africa (Egypt, Abyssinia, Angola).

Dr. Peters distinguishes his *N. angolensis* from this species by the darker colour of the fur, and by the greater size of the second small premolar. The first character is extremely variable, and I believe (from an examination of many specimens of different species of the genus) that the size and position of the second small premolar vary within certain limits, as in the closely allied genus *Rhinolophus*, to an extent, however, sufficiently great to render the comparatively larger size of this tooth in *N. angolensis* of little importance when considered as a distinguishing character. I have therefore included that form as a synonym of *N. thebaica*.

The next (?) species is closely related to this, and is distinguished only by its longer ears and by the position of the second lower premolar.

a. ad. sk.	Egypt.
b. ♀ ad.; al.	No history.

7. Nycteris capensis.

Nycteris capensis *et* affinis, *Smith, Zoological Journal*, 1829, p. 433.
Nycteris discolor, *Wagner, Suppl. Schreb. Säugeth.* i. p. 440, v. p. 646 (vide *Peters, MB. Akad. Berl.* 1870, p. 904).
Nycteris fuliginosa, *Peters, Reise nach Mossambique, Säugeth.* p. 46, pl. x. (1852); *MB. Akad. Berl.* 1870, p. 906, fig. 8.
Nycteris capensis, *Smith, Peters, MB. Akad. Berl.* 1870, p. 904, fig. 6.
Nycteris damarensis, *Peters, MB. Akad. Berl.* 1870, p. 905, fig. 7.

Ears longer than in *N. thebaica*, almost as long as in *N. macrotis*; tragus quite similar in shape.

Fur generally similar in colour to that of *N. thebaica*, but specimens from certain localities (as *N. fuliginosa*, Peters, from Zanzibar) are much darker throughout.

The second lower premolar is minute, and stands in the tooth-row, or is partially drawn inwards.

Length (of an adult ♂), head and body 2″, tail 2″·3, head 0″·75, ear 1″·35, tragus 0″·3×0″·18, forearm 1″·8, thumb 0″·5, third finger 3″·2, fifth finger 2″·5, tibia 0″·95, calcaneum 0″·6, foot 0″·4.

Hab. South Africa (Damara Country, Kaffraria, Natal, Zanzibar, Zambesi).

Dr. Peters distinguishes *N. fuliginosa* from *N. capensis* by its

smaller tragus, and by the larger size of the second lower premolar. I have compared specimens of *N. fuliginosa* collected by Dr. Peters and by Dr. Kirk with those of *N. capensis*, and fail to discover any difference of sufficient importance to lead me to consider them specifically distinct. I have also examined the type of *Nycteris damarensis*, and find that it differs from specimens of *N. capensis* in its slightly larger ears, somewhat larger second lower premolar, and white under surface. These differences are probably due to the combined effects of age and locality. *N. capensis* may turn out hereafter, when a sufficient number of specimens are available for comparison, to be a variety only of *N. thebaica*.

a. ad. sk. (type).	South Africa.	Sir A. Smith [P.].
b. ad. sk.	South Africa.	Stockholm Museum.
c. ad. sk.	South Africa (Damara Land). (Type of *N. damarensis* (Gray), Peters.)	Purchased.
d. ♀ ad., al.	River Zambesi. (*N. fuliginosa*, Peters.)	Dr. Peters [C.].
e. ♂ ad., al.	East Africa.	Dr. Kirk [P.].

Family VESPERTILIONIDÆ.

Vespertiliones, *Peters* *, *MB. Akad. Berl.* 1865, p. 258.
Vespertilionidæ, *Dobson, Ann. & Mag. Nat. Hist.* 1875, xvi. p. 347; *Monogr. Asiat. Chiropt.* p. 82 (1876) †.

Bats with nostrils opening by simple crescentic or circular apertures at the extremity of the muzzle, not surrounded or margined by distinct foliaceous cutaneous appendages ‡; with moderately developed, generally separate ears with comparatively large tragi; with two phalanges in the middle finger, of which the first is extended (in repose) in a line with the metacarpal bone; with rather short legs and rudimentary fibulæ; with a long tail (in some genera longer than the head and body) contained in and produced to the hinder margin of the large interfemoral membrane.

Skull of moderate size; nasal and frontal bones not much extended laterally nor vertically, nor furrowed by deep depressions, as in *Nycteridæ*. The number of incisors varies from $\frac{2-2}{6}$ to $\frac{1-1}{6}$, rarely (in *Antrozous* only) $\frac{1-1}{4}$; premolars $\frac{3-3}{3-3}$, or $\frac{2-2}{2-2}$, or $\frac{1-1}{2-2}$, rarely $\frac{2-2}{3-3}$. The upper incisors are small, separated by a wide space in the centre, and placed in pairs or singly near the canines. Where the upper premolars exceed one in number on each side, the anterior premolars are generally minute, and often placed more or less internal to the tooth-line. The molars are well developed, with acute W-shaped cusps.

* Add the genus *Nyctophilus*.

† *Vespertilionidæ*, Gray (Ann. & Mag. Nat. Hist. 1866, xvii. p. 89), includes genera belonging to very distinct families.

‡ A rudimentary nose-leaf in *Nyctophilus*.

The Vespertilionidæ are easily distinguished from other Bats by their simple nostrils terminating the conical moderately elongated muzzle, by the long tail produced to the hinder margin of the large interfemoral membrane, and by the upper incisors, which are separated by a wide space and placed near the canines. Their eyes are minute; and the inner margins of the ears arise from the sides of the head, not from the forehead.

Distribution. Generally distributed throughout the temperate and tropical regions of both hemispheres.

Synopsis of the Genera.

A. Crown of the head flat or slightly raised above the face-line; upper incisors close to the canines.

a. Nostrils margined behind by rudimentary nose-leaves, or by grooves on the upper surface of the muzzle; ears generally very large; forehead grooved ..... *Group I. PLECOTI.*

a'. A small or rudimentary nose-leaf above the nasal apertures; incisors $\frac{1-1}{4}$ or $\frac{1-1}{6}$.

a''. Incisors $\frac{1-1}{4}$; margins of the nasal apertures continuous with the rim of a small disk above; ears separate ..... 1. ANTROZOUS, p. 170.

b''. Incisors $\frac{1-1}{6}$; a small nose-leaf above and behind the nasal apertures; ears united ..... 2. NYCTOPHILUS, p. 171.

b'. No nose-leaf; nostrils in front of grooves on the upper surface of the muzzle; ears very large.

c''. Incisors $\frac{2-2}{6}$; ears united.

c'''. Premolars $\frac{2-2}{2-2}$; outer margin of the ear-conch carried forwards above the mouth and in front of the eye ..... 3. SYNOTUS, p. 175.

d'''. Premolars $\frac{2-2}{3-3}$; outer margin of the ear-conch terminating near the angle of the mouth . 4. PLECOTUS, p. 177.

d''. Incisors $\frac{1-1}{6}$; ears separate.

e'''. Premolars $\frac{1-1}{2-2}$; outer margin of the ear-conch terminating near the angle of the mouth . 5. OTONYCTERIS, p. 181.

b. Nostrils simple, opening by crescentic or circular apertures at the extremity of the muzzle; ears generally moderate; forehead not grooved ..... *Group II. VESPERTILIONES.*

b'. The outer margin of the ear-conch

commences near the angle of the mouth; ears generally shorter than the head, triangular or rhomboidal in outline; tragus curved inwards or straight; muzzle nearly naked in front of the eyes, with well-developed glandular eminences; upper premolars not exceeding 2—2, the first premolar minute or absent.

b''. Premaxillary bones moderately developed, occupying half the space between the canines; upper inner incisors bifid, separated from the canines by a space; inc. $\frac{2-2}{6}$, rarely $\frac{1-1}{6}$.

α. No lobular projection from the lower lip near the angle of the mouth; tibiæ short.... 6. VESPERUGO, p. 183.

β. A distinct lobular projection near the angle of the mouth; tibiæ long ..... 7. CHALINOLOBUS, p. 246.

c''. Premaxillary bones very narrow, slender; upper incisors unicuspidate, close to the canines; inc. $\frac{1-1}{6}$.

γ. The first lower premolar small, crushed in between the canine and second premolar; membranes thick, nearly naked.. 8. SCOTOPHILUS, p. 256.

δ. The first lower premolar not crushed in between the adjoining teeth; membranes thin.

α'. Tragus straight, outer margin convex; interfemoral membrane nearly naked.. 9. NYCTICEJUS, p. 266.

β'. Tragus curved inwards, outer margin strongly angular below; interfemoral membrane more or less completely covered with hair ..... 10. ATALAPHA, p. 267.

c'. The outer margin of the ear-conch commences abruptly nearly opposite the base of the inner margin of the tragus; ears generally as long or longer than the head, narrow, thin; tragus long and narrow, straight or curved outwards; muzzle narrow and hairy in front; upper premolars generally 3—3, the first premolar well developed.

h''. Nostrils tubular, projecting considerably beyond the extremity of the muzzle; premolars $\frac{2-2}{2-2}$. 11. HARPIOCEPHALUS, p. 276.

i''. Nostrils simple, scarcely projecting; premolars $\frac{3-3}{3-3}$.
i'''. Nasal apertures crescentic; first and second upper premolars much smaller than the third — 12. VESPERTILIO, p. 284.
j'''. Nasal apertures circular; first and second upper premolars nearly equal to the third.... — 13. KERIVOULA, p. 330.

B. Crown of the head greatly elevated above the face-line; upper incisors separated from the canines, and also in front ..... *Group III. MINIOPTERI.*
a. Premolars $\frac{3-3}{3-3}$.
a'. Base of thumbs and soles of feet simple ..... — 14. NATALUS, p. 341.
b'. Base of thumbs and soles of feet with adhesive disks ..... — 15. THYROPTERA, p. 345.
b. Premolars $\frac{2-2}{3-3}$ ..... — 16. MINIOPTERUS, p. 347.

1. ANTROZOUS.

Antrozous, *Allen, Proc. Philad. Acad. Nat. Sci.* 1862, p. 247; *Monogr. Bats N. America*, 1864, p. 66.

Muzzle cylindrical, margins of the nasal apertures continuous with the rim of a small disk terminating the muzzle above; ears separate, tragus long, attenuated upwards; crown of the head very slightly elevated above the face-line; tail contained in and produced to the hinder margin of the interfemoral membrane, no postcalcaneal lobe.

Incisors $\frac{1-1}{4}$, the upper incisors close to the canines; premolars $\frac{1-1}{2-2}$, the single upper premolar large, close to the canine; the first lower premolar small, crushed in between the canine and second premolar.

Range. Nearctic Region (Californian and Rocky Mountain subregions).

This genus is represented by a single species of very peculiar physiognomy, resembling, in the form of the muzzle, the Bats of the genus *Megaderma*, and differing from all other species of *Vespertilionidæ* in having four lower incisors only. The skeleton, however, is very similar to that of the species of *Nyctophilus* and *Scotophilus*, and differs only in the greater development of the fibula. The skull rather resembles that of *Scotophilus*, but the facial bones are much more prolonged beyond the infraorbital foramen; as in *Scotophilus*, the supraoccipital crest is the highest point of the skull; the bony palate extends to the middle of the zygomata; the tympanic bullæ are large, but leave a small portion of the cochleæ uncovered; the basioccipital is rather wide between the cochleæ, and is not marked by any excavations (Plate XI. fig. 6*a*).

1. Antrozous pallidus.

Vespertilio pallidus, *Leconte, Proc. Philad. Acad. Nat. Sci.* 1855, p. 43.
Antrozous pallidus, *Allen, Proc. Philad. Acad. Nat. Sci.* 1862, p. 247; *Monogr. Bats N. America*, p. 68, figs. 65–67 (1864).

Muzzle cylindrical, shortly conical in front, the extremity truncated and terminated by a small, not well-defined disk, bounded above by a very slightly raised ridge (Plate XI. fig. 6) continuous with the outer and upper margins of the nasal apertures, which are directed forwards; ears longer than the head, triangular above, but the tips are obtuse and the outer and inner margins convex; base of the inner margin of the ear-conch very convex, outer margin terminating abruptly midway between the base of the tragus and the angle of the mouth; tragus long, attenuated upwards towards its subacute tip, inner margin straight, outer convex, with a slightly irregular margin below, straight in upper half.

Tail long, of eight vertebra, the last free or half-free; feet moderately large; wings from the base of the toes.

The muzzle is nearly naked in front of the eyes, and the fur scarcely extends upon the wing- or interfemoral membranes.

Fur, above, pale yellowish brown, the base of the hairs pale buff; beneath, pale buff.

Upper incisors unicuspidate, well developed (Plate XI. fig. 6*b*); lower incisors trifid; last upper molar very narrow, forming a transverse plate only (Plate XI. fig. 6*a*).

Length, head and body 2″·4, tail 1″·8, free from membrane 0″·1, head 0″·85, ear 1″ × 0″·55, tragus 0″·55, forearm 2″, thumb 0″·38; third finger—metacarp. 1″·75, 1st ph. 0″·6, 2nd ph. 0″·85; fifth finger—metacarp. 1″·6, 1st ph. 0″·45, 2nd ph. 0″·4; tibia 0″·85, calcaneum 0″·55, foot 0″·33.

Hab. Western North-America (Texas, Oregon, California, N. Mexico).

a.	♀ ad., al.	Mammoth Valley, California.	Dr. Brown [C.].
b.	♀ ad., al.	California.	Smithsonian Institute [P.].
c.	skeleton.	California.	Smithsonian Institute [P.].

2. NYCTOPHILUS.

Nyctophilus, *Leach, Trans. Linn. Soc.* xiii. p. 78 (1822); *Temminck, Monogr. Mammal.* ii. p. 47 (1835–41); *Wagner, Suppl. Schreb. Säugeth.* v. p. 649 (1855); *Tomes, P. Z. S.* 1858, p. 26.
Barbastellus, *Gray, Zoolog. Miscell.* 1831, p. 38.

Crown of the head slightly elevated above the face-line; muzzle narrow, very similar in general shape to that of *Plecotus*; nostrils at the extremity of the muzzle in the front margin of a fleshy eminence, their upper margins continuous with the base of a small cordate nose-leaf; ears large, oval, conjoined by a band arising from the forehead between the eyes; tragus short, triangular, in outline somewhat similar to that of *Synotus*; eyes large. Wings from the base of the toes: tail almost wholly contained within the interfemoral membrane.

Dentition. Inc. $\frac{1-1}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

Upper incisors unicuspidate and close to the canines.

(For general description of skeleton see p. 173.)

Range. The Australian Region (except New Zealand).

The fleshy disk behind the small nose-leaf in this genus is evidently formed by the union of the greatly enlarged glandular eminences which in every species of the family are more or less developed. The different stages of development may be traced through *Plecotus* and *Corinorhinus*. The enlarged glands rising slightly above the outer margins of the grooves behind the nasal apertures in *Plecotus* are so greatly enlarged in the closely allied subgenus *Corinorhinus* as, in many individuals, to meet by their inner and superior margins in the centre (see Plate XI. figs. 8 & 9). The line of union is still indicated in *Nyctophilus* by a narrow longitudinal groove on the upper and anterior surface of the fleshy eminence on the muzzle (Plate XI. fig. 7).

The single species on which this genus is founded evidently takes the place of *Plecotus auritus* in the Australian Region. Mr. Tomes has described four species, distinguishing them principally by size, by the greater or lesser development of the bony ridges of the skull, and by the colour of the fur; but these differences appear to me to depend chiefly upon age and locality, and do not seem of sufficient importance to warrant separation into distinct species.

1. Nyctophilus timoriensis.

Vespertilio timoriensis, *Geoffroy, Ann. du Muséum*, viii. p. 200 (1806); *Temminck, Monogr. Mammal.* ii. p. 253 (1835–41).

Nyctophilus geoffroyi, *Leach, Trans. Linn. Soc.* xiii. p. 73 (1822); *Temminck, l. c.* p. 47, pl. 34; *Wagner, Suppl. Schreb. Säugeth.* v. p. 649 (1855).

Nyctophilus geoffroyi, timoriensis, gouldi, unicolor, *Tomes, P. Z. S.* 1858, pp. 29–37.

Ears large, oval, longer than the head, similar to those of *Plecotus auritus* in shape but proportionately smaller, and connected by a much deeper band on the forehead, and the concave surface of the conch is marked by numerous parallel horizontal lines; the inner side of the ear is in the form of an isosceles triangle with a broad base, half the inner margin slopes forwards and upwards, the other half upwards and backwards, the tip rounded off, the upper third of the outer margin straight, sloping outwards, becoming convex in lower two thirds, and terminating in a wart placed close to the angle of the mouth; the broad band connecting the ears extends upwards on each side as far as the middle of their inner margins; tragus rather short, triangular, subacute, the inner and outer margins convex, at the junction of the upper and middle third of the outer margin a small blunt thickened elevation behind, at the base a small lobe. The glandular elevation behind the short nose-leaf, in the front of which the nostrils open, is grooved in the centre by a

small longitudinal sulcus, more defined in some specimens than in others, and especially large in immature animals (Plate XI. fig. 7). The small nose-leaf scarcely exceeds the diameter of the nasal aperture in height; its general shape is broadly cordate, the broad extremity upwards and free, the front surface marked by a depression above each nasal opening.

In the form of the extremities and of the wing- and interfemoral membranes very similar to *Plecotus auritus*, the antebrachial membrane less developed, however.

Wings from the base of the toes; extreme tip of the tail free; calcaneum about three fourths the length of the tibia, with a small postcalcaneal lobe about the centre.

Muzzle very thinly covered with short hairs; the inner side of the ear-conch clothed with a few soft hairs, more thickly ranged along the semicircular ridge, near the inner margin of the ear wing-membranes naked, except along the sides of the body.

Fur remarkably similar to that of *Plecotus auritus* in colour and quality, and, as in that species, variable in shade. In most specimens the hairs on the upper surface are bicoloured, nearly black at the base, the terminal half light or dark brown; beneath, similar at the base, but the extremities of the hairs much paler than on the upper surface, very pale brown or even white.

In the type of *N. unicolor*, Tomes, the fur is dark olive-brown throughout on the upper surface, but this may be due to the specimen being immature; other specimens from Tasmania agree in the colour of the fur with those from Australia.

The skeleton closely resembles that of *Antrozous pallidus* and *Plecotus auritus*. The tympanic bullæ osseæ are as large as in *Plecotus*, and almost wholly conceal the cochlea; the bony palate extends as far backwards as the middle of the zygomatic arch; muzzle very short in front of the infraorbital foramen; nasal and frontal bones flattened, slightly concave; sagittal and occipital crests not prominent, more or less developed according to the age and size of the specimens.

The dentition is almost precisely similar to that of *Scotophilus temminckii*, the same shaped incisors close to the canines, the same narrow last molar, the first lower premolar small and similarly crushed in between the canine and second premolar. The ulna and fibula are reduced to thin fibro-cartilaginous threads; tail of seven vertebræ.

Length (of an adult ♀ from Port Essington), head and body 2″, tail 1″·8, head 0″·8, ear 1″ × 0″·6, tragus 0″·3 × 0″·15, forearm 1″·8, thumb 0″·3; third finger—metacarp. 1″·55, 1st ph. 0″·65, 2nd ph. 0″·9; fifth finger—metacarp. 1″·5, 1st ph. 0″·45, 2nd ph. 0″·35; tibia 0″·8, foot 0″·35.

The above measurements are taken from the largest specimen examined by the writer. Other specimens are often considerably smaller, and the length of forearm appears to vary, in adult individuals, from 1″·6 to 1″·8, the ears from 0″·95 to 1″·1.

Hab. The Australian Region; from the island of Timor to Tasmania, from West Australia to the Fiji Islands.

N. timoriensis, as above remarked, appears to vary in size, in the colour of the fur, and in the development of the glandular prominence behind the small nose-leaf. It is difficult with so few well-preserved specimens to say whether these differences are due to age or sex, or whether they are characters of distinct races of this species. In the smaller specimens the sagittal and occipital ridges are scarcely developed, and in them also the transverse striæ of the ear-conch appear less well marked, the groove along the centre of the glandular elevation behind the nose-leaf better defined, and the fur of the under surface of the body paler in colour. This might seem to be sufficient to separate the smaller specimens into a distinct species, as Tomes has done; but so many intermediate forms unite them to the larger examples that it is impossible to say to which species some of the specimens should be referred were this attempted to be carried out.

The depth of the sulci of the ear-conch, on which so much stress is laid by Tomes as a diagnostic character, appears to depend altogether on either age or the manner of preservation. Young animals have the transverse lines much less distinct, and they are always especially well marked in specimens which have been preserved in strong alcohol. In all other species of Bats the depth of the cranial ridges increases with age, in some cases to a very remarkable extent, and in this species there is evidently no exception to the rule.

At furthest, should the characters described by Tomes prove to be permanent at all ages, they could only be considered indicative of different races of *N. timoriensis*, for the resemblances in all other respects are too close to allow separation into distinct species.

a. ♂ ad., al.	Islands of Torres Straits.	Purchased.
b. sk.	Albany Island, Cape York.	
c–e. ♂ & ♀ ad., al.	Cape York.	Purchased.
f. ♂ ad., al.	North-Australian Expedition.	Dr. J. R. Elsey [C.].
g, h. ♂ & ♀ ad., al.	Port Essington.	Earl of Derby [P.].
i. ♂ ad., al.	Port Essington.	Mr. Allen [C.].
j. sk.*	W. Australia.	Voy. 'Erebus' and 'Terror.'
k–o. sks.	W. Australia.	
p. ♂ ad., al.	W. Australia.	
q. ♀ imm., al.	(Labelled "*Nyctophilus leachii*, Gray.")	
r. ♀ ad., al.	Peak Downs, Queensland.	Purchased.
s. sk.	Moreton Bay. (Type of *Nyctophilus gouldii*, Tomes.)	
t. ♀ imm., al.	Rockhampton.	
u. sk.	Perth, W. Australia.	
v, w. sk.	King George's Sound.	

* Figured in Voyage of 'Erebus' and 'Terror.'

x. ♂ sk.	King George's Sound.	F. M. Rayner, Esq. [C.].
y. sk.	King George's Sound.	Purchased.
z. sk.	Adelaide, S. Australia.	
a'. imm. sk.	Swan River.	Capt. G. Grey [P.].
b'. ♀ imm., al.	Swan River.	Lieut. J. S. Roe [P.].
c'. ♂ ad., al.	N. S. Wales.	Purchased.
d'. sk.	Australia.	Purchased.
e', *f'*, *g'*. sks.	Australia.	Sir T. L. Mitchell [P.].
h'. sk.	? Australia.	Haslar Collection.
i'. ♂ ? ad., al.	Gipps Land.	Purchased.
j'. ♂ ad., al.	Tasmania.	R. Gunn, Esq. [P.].
k'. ♀ imm., al.	Tasmania.	Dr. Milligan [P.].
l'. ♂ imm., al.	(Labelled "Islands of the Pacific.") (Type of *Barbastellus pacificus*, Gray.)	
m'. ♀ imm., al.	Fiji Islands.	

3. SYNOTUS.

Barbastellus, *Gray* *, *Mag. Zool. & Bot.* 1838, p. 494; *Jerdon, Mammals of India*, p. 47.

Synotus, *Keys. & Blas. Wirbelth. Europ.* p. 55; *Wiegm. Archiv*, 1839, p. 305; *Dobson, Monogr. Asiat. Chiropt.* p. 85 (1876).

Crown of the head distinctly elevated above the short and obtuse muzzle. Nostrils opening on the upper surface at the extremity of the muzzle, in front of a naked space, bounded laterally by the raised edges of the very prominent sides of the face; anteriorly the upper lip is divided on each side by a deep groove passing down from the nostril, and the intervening space between and below the nostrils is prominent and rounded (Plate XI. fig. 10). Inner margins of the ears uniting on the forehead slightly in front of the eyes; the outer margin is also carried forwards in front of the eyes, terminating on the face above the upper lip, so that the eye is contained within the external ear; tragus triangular above and attenuated towards the tip. Feet slender, with long toes. Tail nearly as long or longer than the body. Skull considerably vaulted behind the short muzzle.

Dentition. Inc. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Range. The Palæarctic Region.

* Although this genus was defined by Dr. J. E. Gray under the name *Barbastellus* before the term *Synotus* was used by Keyserling and Blasius, yet I agree with Prof. Peters that the latter name should be retained, because the former had been used many years previously to denote a genus very different from *Synotus*. In 1831 the genus *Barbastellus* was defined, having for its type *Barbastellus pacificus*, Gray. In 1838, or perhaps earlier, Dr. Gray discovered that *B. pacificus* was a synonym of *Nyctophilus geoffroyi*, Leach (1822), and, in his "Revision of the Genera of Bats," published in the Mag. Zool. & Bot. 1838, he transferred the term *Barbastellus* to another genus, which he then defined, and named as its type *Vespertilio barbastellus*, Schreb. But the name *Barbastellus* having once been applied to denote a certain genus, cannot be transferred from that genus to another (although the genus in question has been previously defined and named), but must remain as a synonym.

1. Synotus barbastellus.

Vespertilio barbastellus, *Schreb. Säugeth.* i. p. 168, pl. 55 (1775); *Geoff. Ann. du Muséum*, viii. p. 196 (1806); *Montagu, Linn. Trans.* 1808, p. 71; *Wagner, Suppl. Schreb. Säugeth.* i. p. 486 (1844), v. p. 718 (1855); *Temm. Monogr. Mamm.* ii. p. 202, pl. 48 (1835–41).
Vespertilio leucomelas, *Rüppell, Atlas*, p. 73 (1825).
Barbastellus daubentonii, *Bell, Brit. Quadrup.* p. 63 (1837).
Barbastellus communis, *Gray, Ann. & Mag. Nat. Hist.* ii. p. 494 (1838).
Synotus barbastellus, *Keys. & Blas. Wirbelth. Europ.* p. 55 (1839).

Ears broad, as long as the head, laid forwards the tips extend to a point midway between the eye and the end of the muzzle; inner margins conjoined on the forehead by a low vertical band, projecting in front slightly beyond the eye; outer margin terminating abruptly between the eye and the upper lip, and at a point slightly in front of the eye, so that a line drawn from the most anterior part of the inner margin to the termination of the outer margin, above the mouth, passes in front of the eye; the inner margin is regularly convex and slants much backwards, the tip shortly truncated; the outer margin is concave beneath the tip, with a small well-defined circular projecting lobe at the junction of the upper and middle thirds, beneath this straight to the outer end of the terminal lobe. Tragus very broad opposite the base of the inner margin, suddenly narrowed from without inwards opposite the middle of the straight inner margin, attenuated thence upwards to the tip, which is subacutely pointed; the extremity of the tragus reaches as high as the small circular lobe projecting from the outer margin of the ear.

Wings to the base of the toes; toes more than half the length of the foot; postcalcaneal lobe narrow; calcaneum extending half the distance between the foot and end of tail; tail as long as the head and body, projecting slightly beyond the membranes.

On the upper surface the fur of the body extends as far as a line drawn from the middle of the humerus to the knee-joint; on the interfemoral long, extending backwards triangularly as far as half the length of the tail; beneath, the wing-membrane is covered so far as a line drawn from the elbow to the knee, and the interfemoral is clothed with long white hairs to a somewhat less extent than upon the upper surface. Fur, above and beneath, intensely black, the tips indistinctly greyish, the light shade more apparent beneath. On the base of the interfemoral beneath the hairs are white.

Upper incisors sloping inwards and forwards; upper inner incisors long, with a second cusp near the extremity posteriorly and externally; immediately posterior and external to this cusp the small unicuspidate acutely-pointed outer incisor is placed. The first upper premolar minute, in the inner angle between the closely approximated canine and second premolar. First lower premolar scarcely more than half the vertical height of the second premolar, and in transverse diameter not half its size.

Length (of an adult ♂ preserved in alcohol), head and body 1″·8, tail 1″·8, head 0″·65, ear 0″·7, tragus 0″·35, thumb 0″·3, third finger 3″·1, fifth finger 2″·3, tibia 0″·75, foot 0″·3.

Hab. Middle and Southern Europe and Northern Africa and Arabia (England, France, Germany, Southern Sweden, Poland, Middle and Southern Russia, Spain, Italy, Arabia Petræa). Probably extending throughout the temperate regions of Asia and Northern Africa.

a. ♀ ad., al.	Epping Forest.	H. Doubleday, Esq. [P.].
b. ♀ ad., al.	Cheshire.	
c–h. ♂ & ♀ ad., al.	Darmsdorf, Silesia.	Dr. Günther [P.].
i. ad. sk.	Europe.	
j. ad. sk.		

2. Synotus darjelingensis.

Plecotus darjelingensis, *Hodgson*, *Horsfield*, *Ann. & Mag. Nat. Hist.* 1855, xvi. p. 103.
Barbastellus darjelinensis, *Dobson*, *Proc. Asiat. Soc. Beng.* 1875, p. 85.
Synotus dargelinensis, *Dobson*, *Monogr. Asiat. Chiropt.* p. 86 (1876).

The ears, laid forwards, extend nearly one tenth of an inch beyond the end of the muzzle; in general shape quite similar to those of *S. barbastellus*, but the outer margin has no projecting lobe at the junction of its upper and middle third, and is uninterrupted by any abrupt projection from the tip to its termination above the mouth; the tip is broadly rounded off, not truncated. Tragus, as in *S. barbastellus*, triangular, less attenuated above. Muzzle and nostrils quite similar to the European species, but the prominence between the nostrils in front is covered by short hairs, and the inner side of the ear-conch, along the inner margin, is covered with a band of moderately long hairs, extending more than halfway to the tip.

Length (of an adult ♀ preserved in alcohol), head and body 2″, tail 1″·8, head 0″·65, ear 0″·75, tragus 0″·35, forearm 1″·6, thumb 0″·28, third finger 2″·9, fifth finger 2″·2, tibia 0″·8, foot 0″·3.

Hab. India (Darjiling, Khasia hills, Sikhim, Masuri, Simla); Yarkand.

a. ♀ ad., al.	Darjiling.	B. H. Hodgson, Esq. [P.].
b. ad. sk.	India.	Capt. Boys.

4. PLECOTUS.

Plecotus, *Geoffroy*, *Descr. de l'Egypte*, ii. p. 112 (1812); *Keys. & Blas. Wiegm. Archiv*, 1839, p. 306; *Blasius*, *Fauna Deutschlands*, p. 38 (1857); *Dobson*, *Monogr. Asiat. Chiropt.* p. 83 (1876).

Crown of the head elevated above the face-line; nostrils opening at the extremity of the muzzle, on the upper surface, in front of more or less deep grooves; ears very large, united above the forehead, the outer margin of the ear-conch ending abruptly near the angle of the mouth, the inner margin with a more or less promi-

nent rounded projection directed inwards above the base; tragus very large, tapering upwards, with a lobe at the base of its outer margin, rounded, and placed half horizontally.

Dentition. Inc. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

Skull considerably vaulted; bones forming the brain-case very thin; occipital and sagittal crests scarcely developed.

Range. Palæarctic and Nearctic Regions.

Subgenus I. Plecotus.

Nostrils in front of naked semilunate grooves on the upper surface of the muzzle. (*Palæarctic Region.*)

1. Plecotus auritus.

Vespertilio auritus, *L. Syst. Nat.* xii. p. 47; *Schreb. Säugeth.* (1775), p. 163, pl. 50; *Geoffroy, Ann. du Mus.* viii. p. 197 (1806); *Desmarest, Mammalogie*, p. 144 (1820).
Vespertilio otus, *Boie, Isis*, 1825, p. 1206.
Vespertilio cornutus, *Faber, Isis*, 1826, p. 515.
Vespertilio brevimanus, *Jenyns, Trans. Linn. Soc.* xvi. p. 55 (1828).
Plecotus auritus, *Geoffroy, Descript. de l'Egypte*, p. 118 (1812); *Keys. & Blas. Wiegm. Archiv*, 1839, p. 306; *Blasius, Fauna Deutschl.* p. 39 (woodcut), pp. 37–41 (1857); *Kinahan, Proc. Nat.-Hist. Soc. Dublin*, ii. p. 154 (1859); *Dobson, Monogr. Asiat. Chiropt.* p. 84 (1876).
Plecotus ægyptiacus, *Is. Geoff. Guérin's Mag. Zool.*
Plecotus peronii, *Is. Geoff. l. c.*
Plecotus christii, *Gray, Mag. Zool. & Bot.* ii. p. 495 (1838).
Plecotus bonapartii, *Gray, l. c.*
Plecotus homochrous, *Hodgson, Ann. & Mag. Nat. Hist.* 1855, xvi. p. 103.

Head slightly raised above the face-line. Ears very large, nearly as long as the forearm, conjoined by a low band across the forehead at the bases of their inner margins, regularly oval and rounded above, no emargination or concavity in upper third of the outer margin; the outer margin terminates behind the angle of the mouth, from which it is separated by a small wart; the inner margin develops, at a short distance above the base, a rounded prominent lobe directed inwards towards and almost touching its fellow of the opposite side; tragus very long and subacutely pointed, inner margin slightly convex, outer correspondingly concave in upper, convex in lower half, with a rounded lobule slightly above the base, directed downwards and outwards. A large wart above the eye. The nostrils at the anterior extremities of deep well-defined lunate depressions margined by raised rounded edges (Plate XI. fig. 9).

Wings from the base of the toes; antebrachial membrane wide, anterior margin free throughout; feet slender, calcaneum extending less than half the distance between the foot and end of the tail; no postcalcaneal lobe; the last osseous caudal vertebra generally quite free.

Fur, above and beneath, dark at the base; on the upper surface light shining brown, beneath pale ashy or dirty white. The colour of the extremities of the fur, above and beneath, appears to vary sometimes considerably, according to age and locality; young individuals, and probably females also, are much darker than adult males. Specimens are occasionally found with a reddish tinge on the dorsal surface. Examples from Northern Africa and sandy districts in the neighbourhood of the Mediterranean and Caspian seas are much paler in colour throughout than those from moister countries. This I have frequently observed in specimens of Bats brought from desert regions.

Upper incisors parallel on each side; the inner long and unequally bifid, the smaller cusp external; the outer incisor scarcely half the length of the inner incisor, unicuspidate, not equalling the outer small cusp of the inner incisor in vertical extent, and scarcely one quarter its size; the second premolar exceeds the canine in transverse section, and is but slightly less than it in vertical extent; last upper molar about equal to half the antepenultimate molar; second lower premolar about two thirds the vertical extent of the first premolar, but scarcely half its transverse diameter; third premolar longer than the second premolar, but less than the first molar.

Length, head and body 1″·8, tail 1″·8, head 0″·65, ear 1″·4 × 0″·65, tragus 0″·6 × 0″·2, forearm 1″·5, third finger 2″·65, fifth finger 2″·1, tibia 0″·7, calcaneum 0″·7, foot 0″·35.

Hab. The Palæarctic Region, extending from Ireland through Europe and North Africa to the Himalaya, and probably generally distributed throughout the temperate parts of Asia.

Plecotus homochrous, Hodgson, from the Himalaya, can only be distinguished by the slightly greater length of the ears and shortness of the thumbs. I believe it cannot be considered more than a variety of *Pl. auritus*.

a. ♀ ad., al.	London.	
b–i. ♂ & ♀ ad., al.	Devonshire.	Zool. Soc. Coll.
j. ♀ ad., al.	England.	
k. ♂ ad., al.	England.	
l, *m*. ad. sks.	England.	Old Collection.
n, *o*. ad. sks.	Bonchurch, I. of Wight	Rev. C. A. Bury [P.].
p, *q*. ♀ ad., al.	Co. Longford, Ireland.	G. E. Dobson, M.B. [P.].
r. ♂ ad., al.	Darmsdorf, Silesia.	Dr. Günther.
s. ad. sk.	St. Mauria.	M. Leon Galliard [P.].
t. ad. sk.	St. Gothard.	Mr. Brandt's Coll.
u. ♀ imm., al.	Sicily.	Purchased.
v–x. ad. sks.	Europe.	Leyden Museum.
y. ad. sk.	Malta.	Lord Arthur Hay [P.].
z–c'. ♀ ad., al.	Egypt.	Rev. O. P. Cambridge [P.].
d'. ♀ ad., al.	Egypt.	— Wilkinson, Esq. [P.].
e'. ad. sk.	N. Africa.	Dr. Christie [P.].
	(Type of *Plecotus christii*, Gray.)	
f'. ♂ ad.	Cave of Adullam, Palestine.	Canon Tristram [C.].
g'. ♀ ad., al.	Nipal. (Type of *Plecotus homochrous*, Hodgson).	

c', *d'*. ♂ ad., al.		M. Lidth de Jeude.
e'. ad. sk.		Haslar Hospital.
f'. ad. sk.		
g'–*k'*. ♂ & ♀, al.	No history.	
l'. skull.	Darmsdorf.	Dr. Günther [P.].
m'. skull.		M. Lidth de Jeude.
n'. skull.		
o'. skull.	No history.	
p'. skeleton.	Switzerland.	
q'. skeleton.	No history.	

Subgenus II. Corinorhinus.

Nostrils in front of narrow grooves concealed by the greatly enlarged glandular prominences arising from the sides of the muzzle. (*Nearctic Region.*)

2. Plecotus macrotis.

Plecotus macrotis, *Leconte*, *Cuvier*, *Anim. Kingd.* (*M'Murtrie ed.*), App. p. 431 (1831).

Plecotus lecontii *et* townsendi, *Cooper*, *Ann. Lyc. New York*, 1837, pp. 72, 73.

Synotus macrotis *et* townsendi, *Allen*, *Monogr. Bats N. America*, p. 63 (1864).

Corinorhinus macrotis *et* townsendi, *Allen*, *Proc. Acad. Nat. Sci. Philad.* 1865, p. 173.

Ears very long, about three fourths the length of the forearm, conjoined at the bases only, more narrowed towards the tip than in *Pl. auritus*, and rather shortly rounded off; above the base of the inner margin a slight blunt projection, or rather convexity, represents the position of the well-defined projecting lobe in that species; the outer margin is faintly concave in the upper one fifth beneath the tip, then gradually convex, again broadly and slightly concave opposite the lower third of the tragus, ending in a convex lobe behind the angle of the mouth, from which it is separated by a very distinct wart; tragus long, rather narrow, and subacutely pointed.

The glandular prominences between the nostrils and eyes are greatly developed in a vertical direction, and curve inwards over the grooves on the face behind the nasal apertures, so as to cover them and meet together above the muzzle (Plate XI. fig. 8); the nasal apertures are fringed with a narrow horizontal membrane of a paler colour than the surrounding integument. The depth of the upper lip is much greater in front than in *Plecotus auritus*, and more resembles that in *Synotus barbastellus*.

Wings to the metatarsus close to the base of the toes; calcaneum weak, termination not defined, the extreme tip of the tail alone projecting; feet slender, no prominent callous tubercle near the ankle on the sole. The antebrachial membrane much less broad than in *Pl. auritus*, but its anterior margin is free throughout.

The fur of the head does not extend in front of the ears, and the face is nearly naked, except along the upper lip; the ear-conch has a fringe of fine hairs on the inner margin. Above, the wing-mem-

brane is covered thinly as far as a line drawn from the middle of the humerus to the knee-joint; beneath, to the same extent, but more densely; the interfemoral membrane is naked on both surfaces, except about the root of the tail.

Above dark brown; beneath similar, with paler extremities.

Dentition similar to that of *Pl. auritus*; the outer upper incisors are comparatively shorter; the first and second lower premolars very small, slender, and acutely pointed.

Length (of an adult ♀ preserved in spirit), head and body 2″, tail 1″·8, head 0″·75, ear 1″·35 × 0″·85, tragus 0″·6 × 0″·17, forearm 1″·7, thumb 0″·35, third finger 2″·7, fourth finger 2″·3, fifth finger 2″·2, tibia 0″·75, calcaneum 0″·75, foot 0″·45.

Hab. North America (Vancouver's Island, Utah, Missouri, Mississippi, Alabama, S. Carolina, Florida).

Pl. townsendi is said by Allen to differ from *Pl. macrotis* in being larger, in the face being broader and more elongate, and in the greater development of the glandular eminences on the sides of the muzzle. These differences appear to me to be due to age, *Pl. townsendi* representing the perfectly adult condition of the species, in which the glands of the muzzle are more developed. I find that the size of the glandular eminences varies considerably in different specimens even from the same locality.

This species agrees with *Pl. auritus* in dentition and in general form, the chief differences being the great development of the glandular eminences on the sides of the muzzle (Plate XI. fig. 8) and the less prominent lobe on the inner margin of the ear above its base; and these characters have been used by Allen as distinguishing marks of his genus *Corinorhinus*. But in some specimens of *Pl. auritus* the glands on the sides of the muzzle form rounded prominences rising slightly above the margins of the naked crescentic depressions behind the nostrils. It is easy to conceive these prominences becoming so large as to bend over and conceal the grooves, and this is what we find in *Pl. macrotis*. I cannot therefore consider this species as the type of a genus distinct from *Plecotus*.

a. ♀ ad., al. Vancouver's Island. Purchased.

5. OTONYCTERIS.

Otonycteris, *Peters, MB. Akad. Berl.* 1859, p. 222.

Crown of the head scarcely raised above the face-line; nostrils opening at the extremity of the muzzle by crescentic apertures continuous with small grooves on the upper surface of the muzzle, much less defined than in *Plecotus*; ears very large, separate; tragus as in *Plecotus*.

Dentition. Inc. $\frac{1-1}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

Teeth like those of *Nyctophilus*. Skull very flat, slanting equally from the occipital crest to the extremity of the nasals.

1. Otonycteris hemprichii.

Otonycteris hemprichii, *Peters, MB. Akad. Berl.* 1859, p. 222.

Ears very large, much longer than the head, oval, rounded off above; lower third of the inner margin of the ear-conch strongly convex, but not forming a projection as in *Plecotus auritus*; upper two thirds slightly convex, outer margin straight in upper third, then strongly convex, emarginate opposite the base of the tragus, terminating near the angle of the mouth; tragus very similar to that of *Plecotus auritus*.

Wings from the base of the toes; calcaneum without a distinct postcalcaneal lobe; tail long, of eight vertebræ, half the last osseous vertebra free; the fourth and fifth fingers terminating in T-shaped cartilaginous processes.

Fur rather long and dense, scarcely extending upon any part of the membranes or extremities, and leaving the muzzle in front of the eyes nearly naked; above pale sepia, the basal two thirds of the hairs very pale buff, almost white; beneath pale buff or dirty white throughout; ears and membranes pale brown.

Upper incisors unicuspidate, close to the canines, each with a prominent external basal process; the single upper premolar large, close to the canine, last upper molar consisting of a narrow transverse plate; the lower incisors are peculiar, each tooth is flattened laterally, so that its long diameter in cross section is at right angles to the semicircular line in which the teeth are placed between the canines; first lower premolar scarcely half the size of the second, which exceeds the canine in cross section at its base, and nearly equals it in vertical extent.

Length (of an adult ♀), head and body about 3″, tail 2″·3, head 1″·1, ear 1″·45, tragus 0″·6, forearm 2″·6, thumb 0″·5; third finger—metacarp. 2″·4, 1st ph. 0″·9, 2nd ph. 1″·2; fourth finger—metacarp. 2″·3, 1st ph. 0″·65, 2nd ph. 0″·6; fifth finger—metacarp. 2″·3, 1st ph. 0″·6, 2nd ph. 0″·45; tibia 1″·1, foot 0″·5.

Hab. N.E. Africa; N.W. Himalayas (Gilgit, 5000 feet).

Otonycteris hemprichii resembles *Plecotus auritus* very closely in general external structure. The proportional lengths of the bones of the extremities, the form of the ear-conch and tragus, and the structure and mode of attachment of the volar membranes are very similar in both species, which differ, however, very considerably in the shape of the skull, in dentition, and in the shape and extent of the grooves behind the nasal apertures.

The only specimens of this species yet obtained are the type in the Berlin Museum from the collections of MM. Hemprich and Ehrenberg, made in Africa, and a well-preserved skin of an adult female in this Museum, which was brought by Captain J. Biddulph from Gilgit. From the latter specimen (which Prof. Peters has very kindly compared with the type) the above description has been taken.

a. ad. sk. Gilgit. Captain J. Biddulph [P.].

6. VESPERUGO.

Vesperugo, *Keys. & Blas. Wiegm. Archiv*, 1839, p. 312; *Fauna Deutschl.* p. 49 (1857).

Muzzle generally very broad and obtuse, the glandular prominences between the eyes and the nostrils well developed, increasing the width of the face; crown of the head flat, or very slightly raised above the face-line; nostrils opening sublaterally by simple crescentic apertures on the front surface of the naked extremity of the muzzle; ears separate, generally much shorter than the head, broad and triangular, the outer margin extending forwards beyond the base of the tragus, the internal basal lobe rounded; tragus generally short and obtuse, the outer margin more or less convex, the inner margin straight or concave. Tail less than the length of the head and body; the calcaneum generally supports on its posterior margin a small rounded cutaneous lobe (*the postcalcaneal lobe*), which, in this genus and in the closely allied genus *Chalinolobus*, reaches its greatest development; feet short and broad; membranes thin.

Dentition. Inc. $\frac{2-2}{6}$, in the subgenera *Scotozous* and *Rhogeëssa* $\frac{1-1}{6}$; pm. $\frac{2-2}{2\ 2}$, or $\frac{1-1}{2\ 2}$, or (in the subgenus *Lasionycteris* only) $\frac{2-2}{3-3}$. Upper incisors in pairs separated by a wide interval; the outer upper incisors on each side parallel, and close to the longer inner one, often minute, rarely absent; first upper premolar minute or absent; first lower premolar in the tooth-row, not crushed in between the adjoining teeth; its summit directed slightly outwards.

The Bats of this genus are generally easily distinguished by their comparatively thickly formed bodies, by their flat broad heads and obtuse muzzles, the thickness of which is increased in front by the rounded glandular elevations, by their short, broad, and triangular, obtusely pointed ears, by their obtuse and usually slightly incurved tragus, by their short legs, and by the presence in most species of a well developed postcalcaneal lobule (see Plate XIII. fig. 1). This lobule (which is supported by a cartilaginous process derived from the calcaneum) probably acts as a kind of adhesive disk in securing the animal's grasp when climbing over smooth surfaces.

Some of the species, however, in their external form closely resemble those of other genera, while others, although corresponding with the typical forms of the genus in general external structure, yet differ in the number of their teeth. Thus *V.* (*Vesperus*) *velatus* resembles *Plecotus auritus* so very closely in the form of the ear-conch and tragus that it has been made the type of a genus *Histiotus* by Gervais; and *V. annectens* agrees so remarkably in general form with the species of *Vespertilio* that it can only be distinguished by its dental characters; while *V.* (*Rhogeëssa*) *parvulus* and *V.* (*Scotozous*) *dormeri* correspond rather with the genera *Nycticejus* and *Scotophilus* in dentition, although they evidently belong in their aggregate characters to this genus.

This genus probably contains the greatest number of individuals

among the genera of Chiroptera. The common Bats of all countries, especially of those lying within the temperate and subtropical regions of the northern hemisphere, generally belong to it. The characters of the species often vary considerably within certain bounds; and specimens of the same species, even from the same locality, occasionally present differences which lead to their being regarded as examples of distinct species.

The colour of the fur is generally dark brown or black, the extremities of the hairs of a paler colour on the upper surface and ashy or whitish beneath.

Range. Generally distributed throughout all regions of the earth, but more common in the temperate and subtropical regions of the eastern hemisphere. The species of this genus have also the most northerly range, and one, *Vesperugo borealis*, has been found close to the limits of the Arctic Circle.

Synopsis of Subgenera.

A. Incisors $\frac{2-2}{6}$.

a. Outer upper incisors well developed, or if small, yet distinct; no bone in the penis.

a'. Lower premolars 2—2.

a''. Upper premolars 1—1 ..... 1. VESPERUS, p. 184.

b''. Upper premolars 2—2 ..... 2. VESPERUGO, p. 209.

b'. Lower premolars 3—3 ..... 3. LASIONYCTERIS, p. 238.

b. Outer upper incisors very small, scarcely raised above the gum, occasionally posterior to the tooth-row; penis with a distinct bone.

c''. Premolars $\frac{1-1}{2-2}$ ..... 4. HESPEROPTENUS, p. 239.

B. Incisors $\frac{1-1}{6}$.

d''. Premolars $\frac{1-1}{2-2}$ ..... 5. RHOGEËSSA, p. 245.

e''. Premolars $\frac{2-2}{2-3}$ ..... 6. SCOTOZOUS, p. 243.

Inc. $\frac{2-2}{6}$, *the outer incisors generally much shorter than the inner ones, and in a plane anterior to them; pm.* $\frac{1-1}{2-2}$, *the upper premolar large, close to the canine: postcalcaneal lobe narrow: wings from the base of the toes; the last, or the two last caudal vertebræ generally free. Hab.* Eastern and western hemispheres. Subgen. VESPERUS.

Synopsis of the Species.

A. Thumbs and soles of the feet simple, without adhesive cushions.

a. Ears longer than the head, auditory *bullæ osseæ* very large.

a'. Tragus long, attenuated upwards and inclined outwards, reaching its greatest width below the middle of

its outer margin, inner margin convex *.

a''. Ears very much longer than the head, united across the forehead by a distinct band.

a'''. Ears triangular; inner margin of the ear-conch very convex in the lower third.

a. Ears more than one third longer than the head, united by a deep band; the last two caudal vertebræ free; forearm 2″ ..... 1. *V. velatus*, p. 188.

b. Ears oval; inner margin of the ear-conch moderately convex throughout.

β. Ears nearly double the length of the head, united by a deep band; the last and the antepenultimate caudal vertebræ free; forearm 1″·8 .. 2. *V. macrotus*, p. 189.

γ. Ears about one third longer than the head, united by a low band; tail and forearm as in the preceding species.. 3. *V. montanus*, p. 189.

b''. Ears scarcely longer than the head, not united.

δ ..... 4. *V. magellanicus*, p. 190.

b. Ears shorter than the head; auditory *bullæ osseæ* moderate.

b'. Tragus moderately long, reaching its greatest width slightly above the base of its inner margin; postcalcaneal lobe very narrow or absent.

b''. Inner upper incisors with a small external cusp or projection near their extremities, disappearing as the teeth become worn.

b'''. Outer upper incisors minute, close to and slightly in front of the inner incisors; one or more caudal vertebræ quite free from the interfemoral membrane.

a. The ears laid forwards extend more than midway between the eyes and the end of the muzzle; last two caudal vertebræ free; forearm 2″·25 5. *V. serotinus*, p. 191.

β. The ears laid forwards extend slightly beyond the eyes; last caudal vertebra free; forearm 2″·15..... 6. *V. andersoni*, p. 195.

γ. The ears laid forwards extend almost as far as the end of

* Genus *Histiotus*, Gervais.

the muzzle; the last caudal vertebra and half the antepenultimate vertebra free; forearm 1″·45 ..... 7. *V. hilarii*, p. 196.

c‴. Outer upper incisors minute, close to and quite external to the inner incisors; half the last caudal vertebra free.

c⁴. Muzzle broad and flattened in front, nostrils opening by oblique slits.

δ. Ears much shorter than the head; forearm 1″·35 .... 8. *V. platyrhinus*, p. 196.

d⁴. Muzzle as in *V. serotinus*; ears much shorter than the head.

ε. Smaller; forearm 1″·15 .. 9. *V. minutus*, p. 197.

ζ. Larger; forearm 1″·4–1″·6. 10. *V. capensis*, p. 198.

c″. Inner upper incisors unicuspidate.

d‴. Outer upper incisors as in *V. minutus*.

η. The ears laid forwards extend slightly beyond the eyes; last caudal vertebra free; forearm 2″ ..... 11. *V. megalurus*, p. 199.

e‴. Outer upper incisors as in *V. serotinus*.

θ. The ears laid forwards extend more than midway between the eyes and the extremity of the muzzle, which projects far beyond the lower lip; fur white beneath; forearm 1″·45..... 12. *V. nasutus*, p. 200.

c′. Tragus rather short, reaching its greatest width *about* the middle of its inner margin, not curved inwards, inner margin straight; postcalcaneal lobe distinct.

d″. Inner upper incisor on each side with a distinct external second cusp at or near its extremity.

d‴. Outer upper incisors very short, unicuspidate; tail almost wholly included in the interfemoral membrane; ears much shorter than the head.

ι. Wing-membranes and fur beneath pure white; forearm 1″·15 13. *V. tenuipinnis*, p. 200.

κ. Wing-membranes and fur brown; forearm 1″·2..... 14. *V. pumilus*, p. 201.

e‴. Outer upper incisor on each side nearly as long as the outer cusp of the inner incisor; lower incisors in the direction of the jaws; ears much shorter than the head.

λ. Half the last caudal vertebra free; forearm 1″·25 ..... 15. *V. grandidieri*, p. 202.

μ. The last two caudal vertebræ free; forearm 1″·6 ..... 16. *V. propinquus*, p. 203.

f ‴. Outer upper incisors on each side longer than the outer cusp of the inner incisor; lower incisors at right angles to the direction of the jaws; ears much shorter than the head.

ν. The last two caudal vertebræ free; forearm 1″·5..... 17. *V. borealis*, p. 203.

d′. Tragus rather short, *expanded above*, reaching its greatest width slightly *above* the middle of its inner margin, not curved inwards, inner margin straight; postcalcaneal lobe distinct.

e″. Inner upper incisor on each side with a distinct external second cusp.

g ‴. Outer upper incisor on each side nearly as long as the outer cusp of the inner incisor.

*g*⁴. Ears shorter than the head, the last osseous caudal vertebra quite free.

ξ. Fur yellowish white on the upper surface; forearm 1″·6 18. *V. discolor*, p. 204.

h‴. Outer upper incisors minute.

*h*⁴. Ears very nearly as long as the head; the last rudimentary caudal vertebra alone free.

ο. Ears oval; fur deep black; forearm 1″·7 ..... 19. *V. atratus*, p. 206.

e′. Tragus short, expanded above and curved inwards.

f″. Inner upper incisor on each side with a distinct external second cusp at or near its extremity.

i‴. Outer upper incisor on each side very short, unicuspidate, scarcely exceeding the cingulum of the inner incisor in vertical extent.

π. Outer margin of the ear-conch terminating near the angle of the mouth; fur brown above and beneath; forearm 1″·6 ..... 20. *V. pachyotis*, p. 206.

ρ. Outer margin of the ear-conch terminating beneath the lower jaw; chin and throat pure white; forearm 1″·65 . 21. *V. albigularis*, p. 207.

B. Base of the thumbs and soles of the feet with broad adhesive cushions.
σ. Crown of the head remarkably flattened; ears shorter than the head; tragus as in *V. minutus*; forearm 1‴·1..... 22. *V. pachypus*, p. 208.

1. Vesperugo velatus.

Plecotus velatus, *Is. Geoffr. Ann. Sci. Nat.* 1824, p. 446; *Guérin, Mag. Zool.* pl. ii. (1832); *Wagner, Suppl. Schreb. Säugeth.* v. p. 717 (1855).
Vespertilio velatus, *Temminck, Monogr. Mammal.* ii. p. 240 (1835–41).
Histiotus velatus, *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 77 (1855); *Peters, MB. Akad. Berl.* 1875, p. 787.

Ears very large, triangular, united at their bases posteriorly, as in *Plecotus*; base of the inner margin of the ear-conch straight, rounded at junction with the ascending portion, forming a broadly rounded slightly projecting lobe, which almost touches the corresponding part of the opposite ear, ascending inner margin straight or faintly convex, tip of the ear rounded, upper one fourth of the outer margin slightly concave, remaining portion slightly convex; tragus as in *Plecotus auritus*, subacutely pointed and inclined outwards, inner margin regularly and slightly convex, upper half of the outer margin concave, lower half convex, a distinct rounded lobule at the base; nostrils simple, rather close together at the extremity of the muzzle; face bluntly conical; crown of the head not raised above the face-line; thumb short, with a strongly curved claw.

Wings from the base of the toes; postcalcaneal lobe small, shallow; last two caudal vertebræ free.

Fur, above and beneath, dark brown, the extremities of the hairs slightly paler beneath.

Teeth very similar to those of *Vesperugo* (*Vesperus*) *serotinus*. The inner upper incisor on each side long and slightly notched near the extremity, the outer incisor very short and close to the base of the inner incisor; lower incisors trifid, placed at right angles to the direction of the jaws; the single upper premolar close to the canine; first lower premolar in the tooth-row, nearly three fourths the size of the second premolar.

Length, head and body 2″·4, tail 2″·4, head 0″·8, ear 1″·2, tragus 0″·55, forearm 2″, thumb 0″·4; third finger—metacarp. 1″·75, 1st ph. 0″·65, 2nd ph. 1″; fourth finger—metacarp. 1″·7, 1st ph. 0″·55, 2nd ph. 0″·5; fifth finger—metacarp. 1″·7, 1st ph. 0″·5. 2nd ph. 0″·4; tibia 0″·8, foot 0″·45.

(The above measurements have been taken from an adult female specimen preserved in the Berlin Museum; the type in the Paris Museum is slightly smaller, and has a forearm 1″·8 long.)

Hab. Brazil.

2. Vesperugo macrotus.

Nycticejus macrotus, *Poeppig, Reise in Chili*, i. p. 451 (1847).
Vespertilio velatus, *Gay, Hist. Chile, Zoolog.* i. p. 40, pl. i. figs. 2, 2*a* (1847).
Vespertilio velatus, *Philippi, Wiegm. Archiv*, 1861, p. 289.
Histiotus macrotus, *Peters, MB. Akad. Berl.* 1875, p. 788, pl. figs. 2–2 *e*.

Ears much larger than in *V. velatus* and the ear-conch is quite differently shaped, the inner margin being regularly convex, not expanded at the base, the extremity broadly rounded off, the upper third of the outer margin straight or faintly concave, the lower two thirds slightly convex. On the whole the form of the ear is not unlike that of *Vespertilio murinus*. The ears are united, as in the preceding species, by a distinct band. Tragus as in *V. velatus*, slightly longer, and with a smaller lobule at the base of the outer margin.

Wings from the base of the toes; postcalcaneal lobe very narrow; the last caudal vertebra free.

Fur, above, dark brown, with paler extremities; beneath similar, with greyish or ashy tips.

Teeth very similar to those of *V. velatus*.

Length, head and body 2″·2, tail 1″·7, head 0″·8, ear 1″·45, tragus 0″·6, forearm 1″·9, thumb 0″·4; third finger—metacarp. 1″·8, 1st ph. 0″·6, 2nd ph. 0″·95; fourth finger—metacarp. 1″·75, 1st ph. 0″·5, 2nd ph. 0″·6; fifth finger—metacarp. 1″·7, 1st ph. 0″·46, 2nd ph. 0″·4; tibia 0″·8, foot 0″·45.

(The above description is founded on the descriptions referred to in the synonymy, as I have not yet had an opportunity of examining any specimens of this species.)

Hab. Chili.

3. Vesperugo montanus.

Vespertilio montanus, *Philippi, Wiegm. Archiv*, 1861, p. 289.
Vesperus segethii, *Peters, MB. Akad. Berl.* 1864, p. 383.
Vesperus montanus, *Peters, MB. Akad. Berl.* 1875, p. 789, pl. fig. 3 (ear).

Very similar to *V. macrotus* in general structure, but the ears are conspicuously shorter and the inner side of the ear-conch more convex at the base and less convex above; the low band connecting the inner sides of the ears does not rise to any appreciable extent above the integument of the forehead; laid forwards the extremities of the ears extend quite half an inch beyond the end of the muzzle; inner margin of the tragus straight, the upper third of the outer margin slightly concave.

Wings from the base of the toes; postcalcaneal lobe very narrow; calcanea as long as the tibiæ, their acute extremities conspicuously projecting beyond the interfemoral membrane; the last caudal vertebra and half the antepenultimate vertebra projecting.

The face in front of the ears is almost completely naked, along the margin of the upper lip some fine straight hairs form a fringe. The wing and interfemoral membranes are also devoid of fur, which appears to be strictly confined to the body.

Fur, above, dark brown, with light brown extremities; beneath similar, with ashy, almost white, extremities, which cause the fur on the ventral surface to appear whitish throughout.

Upper incisors very like those of *V. serotinus*, the inner incisors long, stout, and bifid, more than twice the transverse diameter of the small outer incisors, which lie close to their bases and slightly in front, as in *V. serotinus*; lower incisors indistinctly trifid and crowded; first lower premolar about half the size of the second.

Length (of an adult ♀), head and body 2″·2, tail 1″·8, head 0″·75, ear 1″·2, tragus 0″·5, forearm 1″·8, thumb 0″·32; third finger—metacarp. 1″·55, 1st ph. 0″·55, 2nd ph. 0″·8; fourth finger—metacarp. 1″·5, 1st ph. 0″·45, 2nd ph. 0″·45; fifth finger—metacarp. 1″·45, 1st ph. 0″·45, 2nd ph. 0″·35; tibia 0″·75, foot 0″·35.

Hab. Neotropical Region (Bolivia, Peru, Chili, Mendoça).

a, *b*. ad. sks.	Bolivia.	Purchased.
c. imm. sk.	Huasampilla, Peru (9000 feet).	Purchased.
d. ad. sk.	East coast of Peru.	
e, *f*. ad. sks.	Chili.	Purchased.
g, *h*. ad. sks.	Chili.	Purchased.
i. ad. ♀, al.	Chili.	Purchased.
j. ad. ♀, al.	Mendoça.	Purchased.
k. ad. sk.		Purchased.
l. skull of *a*.		

4. Vesperugo magellanicus.

Vespertilio magellanicus, *Philippi, Wiegm. Archiv*, 1866, p. 113.
Vespertilio capucinus, *Philippi, l. c.* p. 114.
Vesperus magellanicus, *Peters, MB. Akad. Berl.* 1875, p. 793, pl. figs. 4, 5.

Distinguished from *V. montanus* by the much smaller ears, which scarcely exceed the head in length, and by its slightly smaller size.

Length (of the type of *V. capucinus*, according to Peters), head and body 2″·2, tail 1″·8, head 0″·76, ear 0″·8, forearm 1″·7, thumb 0″·35; third finger—metacarp. 1″·6, 1st ph. 0″·6, 2nd ph. 0″·85; fourth finger—metacarp. 1″·6, 1st ph. 0″·48, 2nd ph. 0″·48; fifth finger—metacarp. 1″·58, 1st ph. 0″·45, 2nd ph. 0″·35; tibia 0″·7, foot 0″·4, calcaneum 0″·73.

Hab. Straits of Magellan.

The types of *V. magellanicus* and *V. capucinus* have been examined by Dr. Peters. That of the former is a stuffed skin of an immature ♀, of the latter the stuffed skin of an apparently adult ♂. In both the tails are wanting. The length of the ears may have been considerably reduced by the drying process used to preserve the skins; and this form is probably really more closely allied to *V. montanus* than appears from an examination of a badly preserved skin.

5. Vesperugo serotinus.

Vespertilio serotinus, *Schreb. Säugeth.* i. p. 167, pl. 53 (1775); *Gmel. Linn. Syst. Nat.* i. p. 48 (1788); *Kuhl, Ann. Wetterau Naturk.* Bd. iv. p. 45 (1819); *Desmar. Mammal.* p. 137 (1820); *Cuv. Règne Anim.* p. 121 (1829); *Bonap. Fauna Ital.* f. xxi. (1832); *Bell, Brit. Quadr.* p. 34, wdct. (1837).
Vespertilio noctula, *Geoff. Ann. du Muséum*, viii. p. 193, pl. (1806).
Vespertilio murinus, *Pallas, Zoogr. Rosso-Asiat.* i. p. 121.
Vespertilio isabellinus, *Temminck, Monogr. Mammal.* ii. p. 205.
Scotophilus serotinus, *Gray, Mag. Zool. & Bot.* ii. p. 497 (1838); *Macgillivray, British Quadrup.* (*Nat. Libr. ser.*) p. 108 (1838); *Jerdon, Mammals of India*, p. 34 (1867).
Vesperugo (Vesperus) serotinus, *Keys. & Blas. Wiegm. Archiv*, 1839, p. 312; *Wagner, Suppl. Schreb. Säugeth.* v. p. 732 (1855); *Blasius, Fauna Deutschl.* p. 76 (1857); *Dobson, Monogr. Asiat. Chiropt.* p. 108, fig. *a* (head), 1876.
Vespertilio turcomanus, *Eversmann, Bullet. de Moscou*, 1840, p. 21.
Scotophilus pachyomus, *Tomes, P. Z. S.* 1857, p. 50.
Vespertilio (Vesperus) mirza, *Filippi, Viaggio in Persia*, p. 342 (1865).
Vesperus bottæ, *Peters, MB. Akad. Berl.* 1869, p. 406.
Vesperus shiraziensis, *Dobson, Journ. Asiat. Soc. Beng.* 1871, p. 459.

Head flat, almost level with the face-line; muzzle thick, conical; glandular prominences less developed than in the species of the subgenus *Vesperugo*; nostrils opening sublaterally, separated by a narrow slightly concave space. Ears slightly shorter than the head; laid forwards the tips extend more than midway between the eye and the end of the nose; inner basal lobe rounded, lower third of inner margin very convex forwards, the upper two thirds faintly convex, broadly rounded at the tip; the upper half of the outer margin straight, then convex, emarginate opposite the base of the tragus, and terminating in a convex lobe ending on a level with the angle of the mouth directly below the posterior angle of the eye. Tragus about twice as long as broad, reaching its greatest width slightly above the base of the inner margin, then lessening in width to the tip, which is obtusely pointed; inner margin straight or faintly concave.

Thumb with a small callosity at the base. Wings from the metatarsus close to the base of the toes. Postcalcaneal lobe shallow. Last two caudal vertebræ free, the projecting portion of the tail nearly as long as the thumb.

The face is covered with very short fur; but the upper lip is fringed with straight hairs, which also cover the chin, radiating outwards from a small central wart beneath.

The fur of the back is moderately long, and scarcely extends upon the wing-membrane, except in the immediate vicinity of the sides of the body and on the interfemoral membrane at the root of the tail; beneath, the wing-membrane is covered to a greater extent, and fine thinly spread hairs pass out along the posterior margin of the humerus and forearm to the carpus; the fur of the abdomen scarcely extends to the interfemoral membrane, but very fine, almost invisible hairs arise from the transverse dotted lines with which it is marked.

Above dark smoke-brown, with paler brown tips; beneath yellowish brown throughout; ears and membranes dark brown. This is the general colour of the fur of European specimens; but those from the dry sandy countries of Northern Africa and Asia Minor are pale buff-brown or straw-colour above, and even paler beneath. Specimens from the Gaboon are dark brown above, and white or pale yellowish white beneath.

Upper inner incisors long and strong, bifid at their extremities, the cusps equal in length; outer incisors very short, scarcely more than one third of the length of the inner incisors, and lying against the outer and anterior side of their bases. Lower incisors trifid, crowded. The first lower premolar about half the vertical extent of the second, and about half its transverse diameter.

The following Table exhibits the measurements of full-grown examples of this species from each of the great continents:—

V. serotinus.	Length, head and body.	tail.	head.	ear.	tragus.	forearm.	thumb.	3rd finger.	5th finger.	tibia.	foot.	tail free from membrane.
	"	"	"	"	"	"	"	"	"	"	"	"
1. Old ♂ with worn teeth. Transylvania	2·8	2·1	0·95	0·35	0·35	2·1	0·4	3·8	2·6	0·85	0·43	0·3
2. Adult ♀ (var. *α*, p. 192). Gaboon, Africa	2·9	2·25	1·0	0·85	0·35	2·15	0·4	3·8	2·6	0·85	0·5	0·25
3. Ad. ♀. Shiraz, Persia	2·55	2·05	0·95	0·85	0·35	2·0	0·4	3·3	2·5	0·9	0·5	0·25
4. Ad. ♂. Guatemala, Central America	2·7	2·15	0·9	0·8	0·35	2·15	...	3·6	2·7	0·9	0·45	0·2

Var. *α*.

This form, from the Gaboon in W. Africa, differs from all previously described examples of *V. serotinus* in having the fur of the under surface of the body pale yellowish white, contrasting strongly with the dark brown hair covering the back. In all other respects the specimens in the collection agree with those of the Serotine from Europe.

For measurements see Table above (No. 2).

Var. *β*. (*Vesperus fuscus.*)

Vespertilio fuscus, *Pal. de Beauvois, Cat. Peale's Museum Philad.* p. 14 (1796) (vide *Allen, Monogr. Bats N. Amer.* 1864, p. 31); *Leconte, Proc. Acad. Nat. Sci. Philad.* 1855, p. 437.

Vespertilio carolinensis, *Geoffroy, Ann. du Muséum*, viii. p. 193 (1806); *Desmar. Mammal.* p. 136 (1820); *Temm. Monogr. Mammal.* ii. p. 237 (1835–41); *Leconte, Cuv. Anim. Kingd.* (*M'Murtrie ed.*), p. 431 (1831); *Proc. Acad. Nat. Sci. Philad.* 1855, p. 434; *Wagner, Suppl. Schreb. Säugeth.* p. 753 (1855).

Vespertilio phaiops, *Rafinesque, Amer. Month. Mag.* 1817, p. 445; *Wagner, Suppl. Schr. Säugeth.* v. p. 756; *Leconte, Proc. Acad. N. Sci.* 1855, p. 437.
Eptesicus melanops, *Rafinesque, Ann. of Nature*, 1820, p. 2.
Vespertilio ursinus, *Temminck, l. c.* p. 235; *Wagner, Suppl. Schreb. Säugeth.* v. p. 756 (1855).
Scotophilus cubensis, *Gray, Ann. Nat. Hist.* 1839, iv. p. 7.
Vespertilio dutertræus, *Gervais, in Ramon de la Sagra, Hist. de l'île de Cuba, Mammif.* p. 6, *Atlas*, t. ii. (1840); *Peters, MB. Akad. Berl.* 1861, p. 151.
Scotophilus MacLeayii, *Gray, List Mammal. Brit. Museum*, 1843, p. 30.
Scotophilus ursinus, *Tomes, P. Z. S.* 1861, p. 278.
Scotophilus carolinensis *et* fuscus, *Allen, Monogr. Bats N. America*, pp. 28–32 (1864).
Scotophilus fuscus, *J. A. Allen, Bullet. Mus. Comp. Anat. Philad.* No. 8, p. 208 (1869).

This variety of *V. serotinus* from the New World has hitherto been distinguished as a distinct species under the name of *V. fuscus*. It differs from European specimens of the Serotine, and from those from Central America, in being smaller, the forearm apparently never exceeding 1″·8 and the foot 0″·4; also in the somewhat deeper emargination in the upper half of the outer margin of the ear.

My discovery of specimens of the Serotine (perfectly indistinguishable from European examples) among a collection made by Mr. Salvin in Guatemala, while interesting as the first recognition of an Old-World species of Bat in America, led me to examine more closely the specimens of *V. fuscus* preserved in the different museums; and I am satified that, at most, they can be considered to represent a variety only of the Serotine. The following Table exhibits measurements of full-grown examples of this variety from different localities:—

	Length, head and body.	tail.	tail free.	ear.	tragus.	forearm.	thumb.	second finger.	fourth finger.	tibia.	foot and claws.	
	"	"	"	"	"	"	"	"	"	"	"	
North America. Presented by the Smithsonian Institute ...	2·4	1·9	0·15	0·7	0·3	1·8	0·3	3·1	2·2	0·75	0·4	ad. ♀
California. Presented by J. H. Gurney, Esq.	2·2	1·9	0·15	0·7	0·32	1·75	0·3	3·0	2·15	0·75	0·4	ad. ♂
Cuba. (Type of *Scotophilus cubensis*, Gray.)	2·3	1·85	0·15	0·7	0·33	1·7	0·3	3·1	2·2	0·75	0·4	ad. ♀
Cuba. (Type of *Scotophilus macleayii*, Gray.)	2·3	1·8	0·15	0·7	0·33	1·75	0·3	3·15	2·2	0·75	0·4	ad. ♂

Hab. The Palæarctic, Ethiopian, Oriental, Nearctic, and Neotropical Regions. In the Palæarctic Region generally distributed from Southern

England to Siberia, and from Northern Germany to Northern Africa, extending through Arabia and Asia Minor to India, where it inhabits the valleys of the Himalayas. In the Ethiopian Region found as far south as the Gaboon, probably passing along the line of hills extending down the western side of Africa to the Cameroon mountains. In the New World apparently generally distributed from Lake Winnipeg to Central America, and throughout the West-Indian islands.

a–e. ad. sks.	England.	Old Collection.
f. ad. sk.	Tintagle Castle, Cornwall.	Old Collection.
g, h. ad. sk.	Isle of Wight.	— Bond, Esq. [P.].
i. ♀ ad., al.	Isle of Wight.	Rev. C. Bury [P.].
j. ad. sk.	Europe.	
k. ♀ ad., al.	Europe.	Leyden Museum [P.].
l. ♂ ad., al.	Moravia.	
m. ♀ ad., al.	Tübingen.	Zool. Soc. Coll.
n. ♂ ad., al.	Tübingen.	Dr. Günther [P.].
o. ♀ ad., al.	Silesia.	
p–t. ♂ ad., al.	Transylvania.	Messrs. Danford & Brown [P.].
u–w. ♂ & ♀ ad., al.	Isar-fakir, Central Asia Minor.	C. G. Danford, Esq. [P.].
x. ♀ ad., al.	Shiraz.	W. T. Blanford, Esq. [C.].
y. ad. sk.	India.	
z. ad. sk.	India.	Capt. Boys [C.].
	(Type of *Scotophilus pachyomus*, Tomes.)	
a'. ♂ ad., al.		Zool. Soc. Coll.
b'–g'. ♂ & ♀, al.		M. Lidth de Jeude.
h'. ♂ imm., al.		
i'. ♀ ad., al.		
j'. ad. sk. (Labelled *V. turcomanus.*)		? Asia Minor.
k'. ad. sk.		
l'. fœtus, al.		M. Lidth de Jeude.
m'. ad., al.	Guatemala.	O. Salvin, Esq. [C.].
n'. ad. sk.	Guatemala.	O. Salvin, Esq. [C.].
o'. skull of *e'*.		
	Var. *α*.	
a–d. ♂ & ♀ ad., al.	Gaboon, W. Africa.	Purchased.
	Var. *β*. (*V. fuscus.*)	
a. ad. sk.	North America.	
b. ad. sk.	New York.	Purchased.
c. ♂ ad., al	Monterey, California.	J. H. Gurney, Esq.
d. ♂ ad., al.	Cuba.	J. S. Macleay [P.].
	(Type of *Scotophilus macleayii*, Gray.)	
e. ♀ ad., a .	Cuba.	
	(Type of *Scotophilus cubensis*, Gray.)	
f. ♀ ad., al.	Cuba.	G. E. Dobson, M.B. [E.].
	(*Vespertilio dutertræus*, Gervais.)	
g. ad. sk.	Barbados.	
h. ♀ ad., al.	? N. America.	Smithsonian Institute.
	(*Scotophilus carolinensis* (Geoffroy), Allen.)	
i. ad. sk.		

6. Vesperugo andersoni.

Vesperus andersoni, *Dobson, Proc. Asiat. Soc. Beng.* 1871, p. 211.
Vesperugo andersoni, *Dobson, Monogr. Asiat. Chiropt.* p. 110, figs. *a*, *b*, *c* (1876).

Head broad and flat; muzzle thick; nostrils opening sublaterally, without intervening emargination; ears moderate, with rounded tips, inner margin convex, with a small lobe at the base, outer edge with a shallow but wide emargination beneath the tip, then convex, and again emarginate opposite the base of the tragus, terminating by forming a small lobe midway between the base of the tragus and the angle of the mouth; tragus obtusely pointed, broadest slightly below the middle, inner margin straight, outer margin with a small rounded lobe at the base, succeeded by a shallow emargination, then convex upwards to its junction with the inner margin.

Toes longer than half the whole foot. Tail of eight vertebræ, the last vertebra free.

The fur of the head and body is moderately long and dense; anteriorly it passes forwards upon the face in front of the eyes as far as the commencement of the glandular prominences of the upper lip, from which only a few long hairs arise; the portion of the face about the eye and in front of the base of the inner margin of the ear is also naked; but the space between the base of the tragus and the angle of the mouth is covered with long hair. In front the ears are naked, except where a few very short hairs appear on the upper and inner sides of the conch; posteriorly the fur of the head encroaches on their bases, but more than one half of their posterior surfaces is completely naked. On the upper surface the fur of the back extends upon the wing-membrane as far as a line drawn from the junction of the proximal and middle thirds of the humerus to the middle of the femur; posteriorly it extends as far only as the root of the tail; and the interfemoral membrane has but a few very fine hairs dusted over its anterior surface as far as the end of the second caudal vertebra. Beneath, the distribution of the fur on the wing-membranes is similar to that on the upper surface, but somewhat more extended; a line of fine thinly spread hairs passes out along the posterior margin of the humerus and forearm to the carpus; posteriorly, the fur of the abdomen covers the root of the tail only, and three fourths of the surface of the interfemoral membrane is occupied by a few thinly spread, very fine, minute hairs.

Fur, above, dark brown with greyish tips; beneath, light greyish brown for two thirds the length of the hairs, the remaining portion ashy.

Dentition as in *V. serotinus*.

Length, head and body 2″·6, tail 1″·9, head 0″·95, ear 0″·75, tragus 0″·3 × 0″·1, forearm 2″·15, thumb 0″·35, third finger 3″·6, fifth finger 2″·6, tibia 0″·83, calcaneum 0″·7, foot 0″·4.

Hab. Momein, Yunan.

Type in the collection of the Indian Museum, Calcutta.

This species resembles *V. serotinus* generally, but the compara-

tively smaller and narrower ears at once distinguish it. Added to this, the extremity of the tail does not project by the last two vertebræ as in *V. serotinus*, the last caudal vertebra being alone free, and the foot is smaller. The differences in the distribution of the fur are described above.

7. Vesperugo hilarii.

Vespertilio hilarii, *Is. Geoffroy, Ann. des Sci. Nat.* iii. p. 441 (1824).
Vespertilio derasus, *Burmeister, Fauna Brasiliens*, p. 77 (1854).
Vesperus hilarii, *Wagner, Suppl. Schreb. Säugeth.* v. p. 757 (1855).

Ears like those of the Serotine, but the concavity occupying the upper half of the outer margin of the ear-conch is conspicuously deeper, and the tragus is longer and narrower; laid forwards, the extremities of the ears extend nearly to the end of the nose; the face in front of the eyes is nearly naked, and the labial glands are more developed than in any other species of the genus.

Wings from the base of the toes: postcalcaneal lobe shallow; last caudal vertebra and half the antepenultimate vertebra free.

Fur dark brown above and beneath, the extremities of the hairs paler; beneath, the terminal third of the hairs are paler than on the upper surface.

Teeth as in the preceding species.

Length (of an adult ♂), head and body 2″·15, tail 1″·65, ear 0″·7, tragus 0″·3, forearm 1″·45, thumb 0″·3, third finger 2″·65, fifth finger 1″·9, tibia 0″·55, foot 0″·35.

Length (of the type specimen), tail 1″·7, forearm 1″·45, thumb 0″·3, fifth finger 2″, tibia 0″·6.

Hab. Neotropical Region (Brazil, Rio Janeiro, Port Alegre).

a. ad. sk.	Brazil.	Purchased.
b. ad. sk.	Rio Janeiro.	Earl of Derby [P.].
c. ad. sk.		Earl of Derby [P.].
d. ad. sk.	No history.	

8. Vesperugo platyrhinus.

Vesperugo (Vesperus) platyrhinus, *Dobson, Ann. & Mag. Nat. Hist.* 1875, xvi. p. 262.

Muzzle broad and obtuse; glandular prominences large, smoothly rounded; nostrils opening near the margin of the upper lip, on a level with the rounded extremity of the muzzle, not emarginate between. The front of the muzzle is evenly bevelled off from the summit of the glandular elevations to the margin of the upper lip; and the nasal apertures are narrow, appearing as small oblique slits in the front of the muzzle (Plate XII. fig. 1, head, enlarged). Ears and tragus as in *V. kuhlii*.

Wings from the base of the toes; postcalcaneal lobe small but distinct; last caudal vertebra half free.

Fur, above, dark brown; paler towards the tip; beneath, similar, the extremities of a lighter colour than on the upper surface.

Upper incisors long, faintly bifid at the extremities; outer incisors very short, scarcely equalling the cingulum of the inner ones;

lower incisors crowded, trifid; the single upper premolar very close to the canine.

Length (of an adult ♂), head and body 1″·8, tail 1″·4, head 0″·7, ear 0″·55, tragus 0″·25, forearm 1″·35, third finger 2″·15, fifth finger 1″·65, tibia 0″·45, foot 0″·25.

Hab. Unknown.

This very peculiar species of *Vesperugo* resembles *V. kuhlii* in size and in general form; but the absence of the first minute upper premolar and the shape of the muzzle at once distinguish it. The shape of the muzzle is so peculiar as to lead me to suspect it may be an individual peculiarity. As the specimen from which the description is taken is well preserved in alcohol, this flattening of the front of the muzzle and extremities of the nostrils is not due to imperfect preservation.

a. ♀ ad., al. (type). M. Lidth de Jeude.

9. Vesperugo minutus.

Vespertilio minuta, *Temminck, Monogr. Mammal.* ii. p. 209 (1835–41).
? Vespertilio hesperida *, *Temminck, l. c.* p. 211.
Vespertilio minutus, *Wagner, Suppl. Schreb. Säugeth.* i. p. 521 (1844).
? Vespertilio subtilis, *Sundevall, Öfvers. Akad. Förhandl.* 1846, p. 119.
Vesperus minutus, *Wagner, Suppl. Schreb. Säugeth.* v. p. 747 (1855).
Scotophilus minutus, *Tomes, P. Z. S.* 1861, p. 33.

Head scarcely raised above the face-line. Ears moderately long, inner margin above the basal lobe slightly convex to the tip, which is shortly rounded off; nearly the upper half of the outer margin concave, the lower convex, slightly emarginate opposite the base of the tragus, and terminating midway between the posterior margin of the tragus and the angle of the mouth in a distinct lobe. The tragus reaches its greatest width slightly below the middle of its inner margin; at the base of the outer margin is a small triangular lobe, succeeded by a shallow concavity, above which the tragus reaches its greatest width, and the outer margin then curves inwards and slightly upwards to form the narrow rounded extremity, which is slightly curved inwards owing to the concavity of the upper third of the inner margin. The glandular prominences between the nostrils and the eyes are well developed and smoothly rounded, and the nostrils do not project.

Wing-membranes to the base of the toes; postcalcaneal lobes very narrow or absent; the extreme tip of the tail alone free; feet rather large and thick.

Above and beneath, the hair of the body extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the knee-joint; the base of the interfemoral about the root of the tail is alone covered. Beneath, a few fine hairs arise from the trans-

* The type of *Vespertilio hesperida*, Temm., is not now to be found in the collection of the Leyden Museum.

verse lines on the base of the interfemoral membrane, and are principally placed along the tail.

Fur, above, dark brown at the base, with light brown tips; beneath, dark brown, with paler or ashy extremities.

Upper inner incisors long and indistinctly bifid at their extremities; outer incisor, on each side, very short, unicuspidate, scarcely as long as the cingulum of the inner incisor and parallel to it, not sloping inwards. Lower incisors crowded; first lower premolar about one third the size of the second premolar and acutely pointed.

Length (of an adult ♂, in sprits), head and body 1″·8, tail 1″·2, ear 0″·55, tragus 0″·23 × 0″·1, forearm 1″·15, thumb 0″·22, third finger 2″, fifth finger 1″·5, tibia 0″·4, foot 0″·28.

Hab. Africa (South of the Sahara); Madagascar.

This species is easily recognised by the very short forearm and wings in comparison to the length of the body.

a. ad. ♂, al.	Angola.	Dr. J. E. Gray [P.].
b. ad. sk.	South Africa.	Stockholm Museum [P.].
c, *d*. ad. sk.	South Africa.	Sir Andrew Smith [P.].
e, *f*. ad. sk.	? South Africa.	Sir Andrew Smith [P.].
g, *h*. ad. ♂, al.	Madagascar.	Rev. W. Ellis [P.].
i. ad., al.	Mahanora, Madagascar.	Purchased.
j. ♂ ad., al.	Anzahamaru, Madagascar.	Mr. Crossley [C.].
k. skull of *b*.		
l. skull of *c*.		

10. Vesperugo capensis.

Vespertilio capensis, *Smith, Zoological Journal*, ii. p. 435; *South African Quarter. Journ.* v. p. 1 (1832).

Vespertilio minutus, *Smith* (non *Tomes*), *Illustr. Zoology S. Africa*, pl. 51 (1848).

Vesperugo (Vesperus) smithii, *Wagner, Suppl. Schreb. Säugeth.* v. p. 747 (1855).

Scotophilus capensis, *Tomes, P. Z. S.* 1861, p. 36.

Resembles *V. minutus* very closely in the form of the head and and ears, but much larger, immature individuals with unconsolidated epiphyses of the finger-bones being larger than perfectly adult specimens of that species.

Ears shorter than the head, triangular, with rounded tips; outer side of the conch with a shallow emargination in the upper half, commencing abruptly so that the tip projects outwards, then slightly convex to termination midway between the base of the tragus and the angle of the mouth; tragus with a straight inner margin and a regularly convex outer margin.

Wings from the base of the claws; the extreme tip of the tail projecting; postcalcaneal lobe narrow.

Above, reddish brown, with paler extremities: beneath similar, but paler. The distribution of the fur generally similar to that of *V. minutus*, but extending further upon the interfemoral membrane above and beneath.

Inner upper incisor long, developing a second small cusp near its

extremity; outer incisor very short, close to the base of the inner incisor and in a plane slightly anterior to it; lower incisor at right angles to the direction of the jaws, overlapping, trilobate; the single upper premolar long, close to the canine; first lower premolar scarcely half the length of the second premolar.

Length, head and body 2″·1, tail 1″·6, ear 0″·55, tragus 0″·25, forearm 1″·4, thumb 0″·25, third finger 2″·5, fifth finger 1″·8, tibia 0″·5, foot 0″·3.

The above are the dimensions of the largest specimen in the collection, which does not appear quite full-grown. In Tomes's measurements of this species the length of the forearm is given as 1″·55, and that of the tibia as 0″·65.

Hab. South Africa (Port Natal; Cape of Good Hope).

a–c. ad. aks.	Cape of Good Hope.	M. Jourdan [C.].
d. ad. sk.	Cape of Good Hope.	Sir A. Smith [P.].
e, f. ♂ & ♀ imm., al.	Cape of Good Hope.	Sir A. Smith [P.].
g. ♂ imm., al.	Cape of Good Hope.	Mr. Argent [C.].
h. ♂ imm., al.	Port Natal.	Rev. F. Callaway [P.].
i. ♀? ad., al.	King Williamstown.	Lieut. H. Trevelyan [P.].
j. ♀ imm., al.		
k. sk.	? South Africa.	Sir A. Smith [P.].

11. Vesperugo megalurus.

Vespertilio megalurus, *Temminck, Monogr. Mammal.* ii. p. 206 (1835–41).

Vesperugo (Vesperus) megalurus, *Wagner, Suppl. Schreb. Säugeth.* v. p. 747 (1855).

About the size of *V. serotinus*. Ears shorter than the head, as in *V. capensis*; tragus as in the Serotine, slightly narrower; head flat; muzzle nearly naked; tail long, the last caudal vertebra quite free; no trace of a postcalcaneal lobe; wings from the base of the toes. Fur moderately long and woolly, much faded in the single type specimen, but apparently similar to that of the Serotine.

Skull like that of *V. serotinus*, but the teeth are very different. The inner upper incisor long, acutely pointed, and *unicuspidate*, the outer incisor very small, with a short, slender, single cusp arising from the broad base which lies between the inner incisor and the canine, not slightly in front of the outer side of the inner incisor as in *V. serotinus*; the single upper premolar close to the canine, last upper molar equal to half antepenultimate molar. Lower incisors as in *V. serotinus*. The first lower premolar smaller and more crushed in between the canine and the second premolar, and elevated by its base above the bases of the other teeth. Base of the skull as in *V. serotinus*, but the tympanic bullæ are larger.

Length (of the type specimen), head and body about 2″·6, tail 2″, head 0″·85, ear 0″·6, tragus 0″·3, forearm 2″, thumb 0″·4; third finger—metacarp. 1″·7, 1st ph. 0″·65, 2nd ph. 0″·85; fifth finger—metacarp. 1″·65, 1st ph. 0″·45, 2nd ph. 0″·3; tibia 0″·8, foot 0″·45.

Hab. South Africa (Kaffraria).

Type in the collection of the Leyden Museum.

V. megalurus has characters common to both *Vesperugo* and *Scotophilus*, resembling the species of the latter genus in the form of the inner upper incisors, which are long and unicuspidate, and in the position of the first lower premolar, also in the absence of a postcalcaneal lobe. In all other respects it agrees with the species of *Vesperugo* (subgen. *Vesperus*), to which genus it undoubtedly belongs.

12. Vesperugo nasutus.

Vesperugo nasutus, *Dobson, Journ. Asiat. Soc. Beng.* 1877, p. 311.

Head flat, muzzle conical, the extremity projecting considerably beyond the lower lip in front, as in the species of the genus *Nyctinomus*, terminated by the margins of the nostrils, which open sublaterally; ears shorter than the head, triangular, with rounded-off tips; the inner margin of the conch commences above the eye, and does not form a distinct rounded lobe at its base, but is straight almost from the base to the tip of the ear, the outer margin is also straight, and terminates rather abruptly midway beneath the tragus and the angle of the mouth; tragus much longer than broad, directed slightly inwards, reaching its greatest width below the middle of its inner margin, outer margin convex, with an ill-defined lobe near the base, inner margin slightly concave, tip subacutely pointed.

Tail almost wholly contained in the interfemoral membrane, the last rudimentary caudal vertebra alone free; no postcalcaneal lobe; wings from the base of the toes.

Fur short; above, pale yellowish brown; beneath, pale buff, almost white; membranes light brown, traversed by numerous white reticulations.

The face is nearly naked in front of the eyes; a few hairs fringe the lips and the under surface of the projecting extremity of the muzzle; the wing and interfemoral membranes are almost naked.

Upper inner incisors moderately long and unicuspidate, outer incisors very short, but slightly exceeding the cingulum of the inner incisors in vertical extent; lower incisors trifid, crowded, placed across the direction of the jaws; the single upper premolar close to the canine, as in *V. serotinus*, the first lower premolar not half the second in vertical extent, with a prominent internal and anterior basal cusp.

Length, head and body 1″·8, tail 1″·7, head 0″·68, ear 0″·6, tragus 0″·25, forearm 1″·45, thumb 0″·25; third finger—metacarp. 1″·3, 1st ph. 0″·48, 2nd ph. 0″·7; fourth finger—metacarp. 1″·3, 1st ph. 0″·4, 2nd ph. 0″·4; fifth finger—metacarp. 1″·3, 1st ph. 0″·28, 2nd ph. 0″·28; tibia 0″·55, foot 0″·28.

Hab. Shikarpur, Scinde. Type in the Indian Museum, Calcutta.

13. Vesperugo tenuipinnis.

Vesperus tenuipinnis, *Peters, MB. Akad. Berl.* 1872, p. 263.

Muzzle broad, obtuse; glandular prominences well developed on

the sides of the face, increasing the width of the muzzle. Ears shorter than the head, triangular, rounded at the tips; outer margin straight, without emargination. Tragus small, and broadly rounded off at the tip, attaining its greatest breadth about the middle of inner margin; outer margin convex, inner straight or slightly concave, above the base of the outer margin a very distinct acutely angular lobule.

Wings to the base of the claws; postcalcaneal lobe close to the ankles, triangular; tail wholly included, except the extreme tip, within the interfemoral membrane.

Wing and interfemoral membranes pure white; ears dark brown; fur on the upper surface dark brown, the forearm, legs, and tail of the same colour; beneath, pure white, the base of the fur dark, the humerus, forearm, and legs white; feet, above and beneath, dark brown.

Muzzle in front of the eyes nearly naked. On the upper and lower surfaces the fur extends for a short distance only upon the wing-membranes. Above, the base of the interfemoral only is clothed; beneath, it is covered with very short hair, as in *V. imbricatus*.

Outer incisors very small and acutely pointed, placed at the outer and anterior side of the base of the inner incisors, which are nearly twice their length, and have a small prominent external cusp; lower incisors at right angles to the direction of the jaws.

Length (of an adult ♂ preserved in spirits), head and body 1″·5, tail 1″·05, head 0″·55, ear 0″·45, tragus 0″·18, forearm 1″·15, thumb 0″·2, third finger 1″·9, fifth finger 1″·4, tibia 0″·45, foot 0″·25.

Hab. Lagos, West coast of Africa; Gaboon.

a. ad. ak.	Lagos.	Purchased.

14. Vesperugo pumilus.

Scotophilus pumilus, *Gray, Append. Grey's Austr. Journ.* p. 406.

The face is concave between the anterior margins of the inner sides of the ears; the muzzle not very obtuse, but the glandular prominences so developed upwards as to cause a shallow furrow between them on the muzzle. Ears short and very funnel-shaped, owing to the great convexity of the middle third of the outer margin; inner margin very convex forwards in its lower two thirds; upper third of the outer margin very concave, owing to the convexity of the middle third, tips short and narrowly rounded-off; tragus rather broad, maintaining the same breadth from the base to a point opposite the upper third of the inner margin, where the outer margin curves inwards to join the inner margin; at the base of the outer margin a very shallow triangular lobe, not succeeded by an emargination, inner margin straight (Plate XII. fig. 2).

Wings to the base of the toes; postcalcaneal lobe long, and convex behind (less distinct in young individuals); tip of tail free.

Above black, the extreme points of the hairs ashy or greyish;

beneath black, the terminal one fifth of the hair white or pale ash-colour, so that the under surface has a greyish appearance.

Inner incisors long and bifid, both cusps nearly equal; outer incisors short, placed in a plane slightly anterior, their unicuspidate extremities directed inwards, so as to lie against the outer side of the inner incisors; lower incisors crowded and trifid; first lower premolar about half the vertical extent of the second premolar; the single upper premolar very close to the canine.

Length (of a ♀ with *fœtus in utero*), head and body 1″·5, tail 1″·35, ear 0″·48, tragus 0″·2, forearm 1″·22, thumb 0″·2, third finger 2″, fifth finger 1″·5, tibia 0″·45, foot 0″·22.

Hab. Australia and Tasmania. In Australia from Cape York to the Murray River and West Australia, probably generally distributed.

a. ♂ ad., al.	Cape York, N. Australia.	
b. ad. sk. (type).	Australia. (Figured in 'Voy. Erebus and Terror.')	
c. ♂ ad., al.	Australia.	Purchased.
d. ♂ ad., al.	Australia.	
e, f. ad. sks.	Yarrundi, Australia.	
g. ad. sk.	Perth, W. Australia.	Mr. Gould [C.].
h. ad. sk.	West Australia.	Mr. Gould [C.].
i–n. ♂ & ♀ ad., al.	King George's Sound.	Dr. Richardson [P.].
o, p. ♀ ad., al.	Murray River.	
q–s. ♂ & ♀, ad., al.	Tasmania.	R. Gunn, Esq. [P.].
t. ad. sk.	Tasmania.	R. Gunn, Esq. [P.].

15. Vesperugo grandidieri.

Vesperugo (Vesperus) grandidieri, *Dobson, Ann. & Mag. Nat. Hist.* 1876, xviii. p. 500.

Head, ears, and tragus very similar to those of *Vesperugo abramus*, Temm. Ears short, rounded off above; outer margin of the ear-conch straight or faintly concave in upper two thirds, emarginate opposite the base of the tragus, terminating in a small rounded lobe midway between the base of the tragus and the angle of the mouth: crown of the head scarcely elevated above the face-line; nasal apertures separated widely, opening forwards, their margins not projecting.

Wing-membrane from the base of the toes; postcalcaneal lobe very shallow; half the last caudal vertebra free.

Fur short on both surfaces, scarcely extending upon the membranes; reddish brown above, paler beneath.

Upper inner incisors bicuspidate, the shorter outer cusp nearly equalled in vertical extent by the unicuspidate outer incisor; lower incisors trifid, not crowded; the single upper premolar close to the canine.

Length, head and body 1″·75, tail 1″·4, ear 0″·5, tragus 0″·22 × 0″·08, forearm 1″·25, thumb 0″·28; third finger—metacarp. 1″·2, 1st ph. 0″·45, 2nd ph. 0″·55; fifth finger—metacarp. 1″·1, 1st ph. 0″·28, 2nd ph. 0″·2; tibia 0″·5, foot 0″·3.

Hab. Zanzibar.

Type in the collection of the Paris Museum.

16. Vesperugo propinquus.

Vesperugo propinquus, *Peters, MB. Akad. Berl.* 1872, p. 262.

Ears triangular, rounded-off above; the ear-conch thickened along the inner margin, flatly emarginate about the middle of the outer side, and at the base with a rim directed inwards, but without emargination. Tragus quite similar to that of *V. borealis*, but quite straight on the inner side, broadest at the middle, and at the base of the outer margin with a tooth-like lobe.

Wings from the base of the toes; the last two caudal vertebræ free; postcalcaneal lobe very distinct.

The fur of the body extends outwards upon the wings as far as a line drawn from the end of the proximal third of the humerus to the knee, and not quite to the middle of the interfemoral membrane; beneath, the membranes are less covered, and the fur of the abdomen extends only upon the base of the interfemoral.

Fur reddish above, the hairs dark brown at their bases; beneath paler, the tips of the hairs being more reddish yellow.

The first upper incisor has two cusps; the second incisor is smaller in cross section, and has a single cusp slightly shorter than the second cusp of the first incisor. The single upper premolar is large. The two lower premolars are very pointed; the first one third smaller and shorter than the second, which is not quite as high as the first true molar. The lower incisors are distinctly trilobed, and placed parallel to the direction of the jaws; the third is much longer than broad.

Length, head and body 2″·4, tail 1″·8, ear 0″·6, tragus 0″·23, forearm 1″·6, thumb 0″·36, third finger 2″·7, fifth finger 2″, tibia 0″·7, foot 0″·35.

Hab. Central America (Ysabel de Guatemala).

The above description has been taken from Dr. Peters's original notes on the species, of which I have not seen the type. It appears to be very closely allied to *V. borealis*; and when a large series of specimens have been compared with an equally large number of *V. borealis* from Europe, it may be found that *V. propinquus* is really but a variety of *V. borealis*.

Dr. Peters remarks that it is closely allied to *V. borealis*, from which it is distinguished by the form of the ears and teeth.

17. Vesperugo borealis.

Vespertilio kuhlii, *Nilsson* (non *Natterer*), *Illum. Fig. Scandin. Fauna*, häft 17. pl. 34 (1836).

Vespertilio borealis, *Nilsson, Illum. Fig. Scand. Fauna*, häft 19. pl. 36 (1838); *Lilljeborg, Sver. Norges Ryggradsdjur*, i. p. 129 (1874).

Vesperugo nilssoni, *Keys. & Blas. Wiegm. Archiv* (1839), p. 315; *Wagner, Suppl. Schreb. Säugeth.* i. p. 498, v. p. 733; *Blasius, Fauna Deutschl.* p. 70, figs. 47, 48 (1857).

Vesperugo borealis, *Dobson, Monogr. Asiat. Chiropt.* p. 105 (1876).

Ears triangular, with broadly rounded tips; the outer margin straight, terminating close to and on a level with the angle of the

mouth; the inner margin with a rounded basal lobe, the ascending part very convex in lower third, then sloping upwards and backwards. Tragus expanded above and slightly curved inwards; the outer margin has an acute triangular lobe at the base; above this it increases in convexity, and the tragus reaches its greatest width about the middle of its outer margin; the inner margin is straight below and slightly concave above.

Wings to the base of the toes; thumbs and feet rather short; a distinct but shallow postcalcaneal lobe; the last two caudal vertebræ free.

Fur, above, very dark brown, with yellowish-brown extremities; beneath, similar, with ashy tips.

On the upper surface the fur of the body extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the knee; beneath, similar; the base of the interfemoral, above and beneath, is alone clothed.

Inner upper incisors bifid; outer incisors as long as the outer cusp of the inner incisors, and equal to the latter in cross section at the base; lower incisers crowded, placed at right angles to the direction of the jaws, trifid, the incisors next the canines rounded above and higher than the rest; first lower premolar small, not half the size of the second premolar, which equals or nearly equals the canine in vertical extent.

The outer upper incisors, generally minute in the subgenus *Vesperus*, appear to reach their greatest development in this species.

Length, head and body 2″, tail 1″·7, head 0″·65, ear 0″·55, tragus 0″·2, forearm 1″·5, third finger 2″·5, fifth finger 2″, tibia 0″·7, foot 0″·35.

Hab. The northern part of the Palæarctic Region. In Europe extending from the Scandinavian Peninsula (where, according to Nilsson, it is found as far north as the Arctic Circle), through Russia to the Ural Mountains, and southwards to the Harz Mountains. As yet not recorded from the British Isles. In Asia inhabiting the Altai Mountains and Northern China, extending as far south as the northern slopes of the Himalayas, a single specimen having been obtained by the late Dr. F. Stoliczka at Kizil.

a. ♂ ad., al.	China.	R. Swinhoe, Esq. [P.].
b. ad. sk.		Purchased.

18. Vesperugo discolor.

Vespertilio discolor, *Natterer, Kuhl, Deutsch. Flederm. Wetter. Ann.* iv. (1819); *Desm. Mamm.* p. 139 (1820); *Bell, Brit. Quadrup.* p. 21, woodcut; *Temm. Monogr. Mammal.* ii. p. 173 (1841).
Vespertilio serotina, *Pallas, Zoogr. Rosso-Asiat.* p. 123.
Scotophilus discolor, *Gray, Mag. Zool. & Bot.* ii. p. 297.
Vesperugo (Vesperus) discolor, *Keys. & Blas. Wirbelth. Europ.* p. 50; *Faun. Deutschl.* p. 73, figs. 49 & 50 (1857); *Dobson, Monogr. Asiat. Chiropt.* p. 106 (1876).
Vesperus discolor, *Wagner, Suppl. Schreb. Säugeth.* v. p. 733 (1855).

Head broad and flat; muzzle obtuse, the glandular prominences

moderately developed, not causing a depression on the face above; end of nose and upper lip slightly projecting beyond the lower lip; inner basal lobe of ear-conch rounded, not very convex forwards; inner margin of ear regularly convex to the tip; rather more than the upper third of the outer margin is straight or slightly concave, a narrow portion of the edge about the middle is folded backwards, then emarginate opposite the base of the tragus, and terminating in a long and deep, but not prominent lobe behind the angle of the mouth, from which it is separated by a wart; tragus narrow opposite the base of the inner margin, expanded above, the outer margin attaining its greatest convexity slightly above the middle of the inner margin, which is straight or slightly convex above, at the base of the outer margin a triangular lobule.

Wings from the base of the toes, which are three fourths the length of the whole foot. Calcaneum margined posteriorly by a narrow lobe. The last caudal vertebra and part of the antepenultimate vertebra free.

On the upper surface the fur of the body extends upon the wing-membrane almost as far as a line drawn from the middle of the humerus to the knee-joint, on the interfemoral membrane as far as the end of the fourth caudal vertebra. Beneath, the wing-membrane is similarly covered; but almost the whole interfemoral membrane is covered with fine hairs, which abound principally along the tail.

Fur, above, dark brown, the terminal fourth of the hairs shining yellowish white; beneath, dark brown, the terminal fourth of the hairs ashy.

Upper inner incisors long, bifid, the outer cusp shorter than the inner, and placed slightly posterior; the outer incisors unicuspidate and short, not equalling the outer cusp of the inner incisor in vertical extent. Lower incisors slightly crowded, but not overlapping. First lower premolar about half the height of the second.

Length, head and body 1″·95, tail 1″·7, ear 0″·6, tragus 0″·25, forearm 1″·6, thumb 0″·28, third finger 2″·5, fifth finger 2″, tibia 0″·7, foot 0″·33.

Hab. The Palæarctic Region. In Europe extending from England through Southern Sweden and Russia to the Ural Mountains, and southwards through France, Germany, and Italy, chiefly found, however, in the mountain tracts of these countries. In Asia recorded as yet from Western Siberia (Barnaul) and Eastern Turkestan (Kizil) only.

a. ♂ ad. sk.	Plymouth.	W. E. Leach, M.D. [P.].
b–e. imm. & ad. sks.	France.	M. Lefevre.
f. imm. sk.	Switzerland.	
g. ad. sk.	Sweden.	Stockholm Museum.
h. ♂ ad., al.		Purchased.
i, *j*. ad. sks.		Purchased.
k. skull of *a*.		

19. Vesperugo atratus.

Nycticejus atratus, *Blyth, Cat. Mammal. Mus. As. Soc. Beng.* no. 96; *Jerdon, Mamm. of India*, p. 38 (1867).
Vesperus atratus, *Dobson, Proc. As. Soc. Beng.* Sept. 1871, p. 212; *Monogr. Asiat. Chiropt.* p. 107, figs. *a*, *b* (1876).

The head is broad and slightly elevated above the face; muzzle obtuse; glandular prominences largely developed, causing a heart-shaped depression above, behind the nostrils. Ears large, oval, with rounded tips, which, in the natural position of the ears, appear acute, owing to a longitudinal folding of the outer side of the conch on the inner, commencing at and almost bisecting the tip, as in the species of *Kerivoula*; inner margin convex; outer slightly hollowed beneath the tip, succeeded by a triangular emargination opposite the base of the tragus, and terminating in a rounded lobe, the summit of which is marked by a small triangular notch; tragus with a small rounded lobe at the outer side of its base, expanded above, convex externally and above, inner margin slightly concave.

Wings from the base of the toes; last rudimentary caudal vertebra free.

Fur rather long and dense, and (so far as can be determined from an examination of specimens in alcohol) intensely black throughout.

Inner upper incisors very long and slightly bifid at the extremity; outer incisors minute, scarcely raised above the level of the gum, and close to the base of the inner incisors.

Length (of an adult ♀ preserved in alcohol), head and body 1″·9, tail 1″·8, head 0″·6, ear 0″·6, tragus 0″·23, forearm 1″·7, third finger 2″·9, fifth finger 2″, thumb 0″·2, tibia 0″·6, calcaneum 0″·5, foot 0″·3.

Hab. Himalaya (Darjiling). Type in the collection of the Indian Museum, Calcutta.

20. Vesperugo pachyotis.

Vesperugo (Vesperus) pachyotis, *Dobson, Proc. Asiat. Soc. Beng.* 1871, p. 213; *Monogr. Asiat. Chiropt.* p. 104, figs. *a–c* (head and teeth) (1876).

Head flat; muzzle very broad and short, glandular prominences much developed; immediately behind them a furrow extends from the anterior corner of one eye to that of the other, beyond which the fur of the head does not pass. Ears triangular above, with rounded tips; outer side straight, without emargination; lower portion of the ear (from below the level of the tip of the tragus to the termination of the outer margin near the angle of the mouth) very thick and fleshy; tragus short, expanded above and curved inwards.

Wing-membrane from the base of the toes. Fur, above, dark brown throughout; beneath, a lighter shade of brown.

Teeth very small; inner incisors bifid at their extremities, much larger and longer than the outer ones.

Length (of an adult ♂ preserved in alcohol), head and body 2″·2, tail 1″·6, head 0″·7, ear 0″·55 × 0″·4, tragus 0″·18 × 0″·1, forearm

1″·6, third finger 2″·7, fifth finger 1″·7, thumb 0″·25, tibia 0″·65, foot 0″·35.

Hab. Khasia Hills, Assam. Type in the collection of the Indian Museum, Calcutta.

This species is readily distinguished by the peculiar thickness of the lower half of the outer side of the ear-conch, which appears, as it were, excavated out of the thick integument of the neck. The tragus is short, rounded off broadly above and curved inwards as in *V. noctula*; but the minute upper premolar, so constant in *V. noctula*, is absent, and the wing-membrane extends to the base of the toes.

In the form of the ears and muzzle especially, and generally in the whole conformation, this species appears to belong to the subgenus *Vesperugo*; but the absence of the first minute upper premolar relegates it to *Vesperus*. Nothing could illustrate better the artificial character of these subgenera, which, however, are convenient in determining the species.

21. Vesperugo albigularis.

Vesperugo (Marsipolæmus) albigularis, *Peters, MB. Akad. Berl.* 1872, p. 260.

Ears very broad and broadly rounded off above; the lower half of the outer margin of the ear-conch broadly folded backwards, as in *V. noctula*, separated in front from the angle of the mouth by a wart, *but terminating below and internal to it under the lower jaw by a small internal prolongation*; tragus broad above, attaining its greatest width above the middle of the inner margin, which is slightly concave, narrowest opposite the base of the inner margin, a prominent triangular lobe at the base of the outer margin. Nostrils rather wide apart, opening sublaterally; muzzle broad and obtuse; crown of the head scarcely elevated above the face-line.

Wings from the base of the toes; postcalcaneal lobe long and narrow; last caudal vertebra free.

Fur dark brown above, the extreme tips hoary, as in *V. noctivagans*, paler beneath, the *chin and throat*, as far back as a line connecting the posterior margins of the ears, *pure white*.

Upper inner incisors long and broad and slightly bifid at their extremities; outer incisors very short, scarcely exceeding the cingulum of the inner ones in vertical extent; the single upper premolar close to the canine; lower incisors in the direction of the jaws; first lower premolar half the size of the second, which exceeds the molars in vertical extent.

Length (of the type specimen, an adult ♂), head and body 2″·35, tail 1″·5, head 0″·7, ear 0″·65 × 0″·4, tragus 0″·25 × 0″·13, forearm 1″·65, thumb 0″·35, third finger 2″·75, fifth finger 2″, tibia 0″·6, foot 0″·35.

Hab. Mexico. Type in the collection of the Berlin Museum.

This species may be at once distinguished from all other species of Vespertilionidæ by the very peculiar manner in which the outer

margin of the ear-conch terminates under the jaw, which has caused the describer, Dr. Peters, to make it the type of a new subgenus, *Marsipolœmus*. In the prolongation of the ear-conch, in the form of the tragus, and in dentition it resembles the African species of *Chalinolobus*.

22. Vesperugo pachypus.

Vespertilio pachypus, *Temminck, Monogr. Mammal.* ii. p. 217, pl. 54. figs. 4–6.
Vesperus pachypus, *Wagner, Suppl. Schreb. Säugeth.* v. p. 741 (1855); *Dobson, Proc. Asiat. Soc. Beng.* 1871, p. 212.
Scotophilus fulvidus, *Blyth, Journ. Asiat. Soc. Beng.* xxviii. p. 293.
Tylonycteris pachypus, *Peters, MB. Akad. Berl.* 1872, p. 704.
Tylonycteris meyeri, *Peters, l. c.* p. 705.
Vesperugo pachypus, *Dobson, Monogr. Asiat. Chiropt.* p. 115 (1876).

Crown of the head very flat, not raised above the broad and flattened muzzle; nostrils not projecting, directed forwards and slightly downwards. Ears shorter than the head, triangular, with rather broadly rounded tips; outer margin straight, terminating towards the angle of the mouth in a small lobe separated by a shallow notch; tragus short, slightly narrowed upwards and rounded off above, reaching its greatest width opposite the base of the inner margin; at the base of the outer margin a small triangular lobule.

Under surface of the base of the thumbs and soles of the feet with broad fleshy pads. In some specimens the pad extends along the inferior surface of the thumb almost to the base of the claw, which is very small and acutely pointed, as in *V. noctula*. On the foot the fleshy sole forms almost a circular disk, especially towards the toes, under which its round margin projects slightly. The toes are short, not exceeding half the foot in length, and are armed with short claws.

Wings rather short; wing-membranes from the base of the toes. Tail projecting by the extreme tip only; calcaneum short and feeble.

Fur fine and very dense, moderately long, scarcely extending upon the membranes; above generally bright reddish brown, paler beneath.

Upper incisors short, the second and shorter outer cusp of the inner incisor exceeding very slightly in vertical extent the unicuspidate outer incisor; lower incisors trifid, not crowded.

Length, head and body 1″·75, tail 1″·3, ear 0″·48, tragus 0″·2, forearm 1″·1, thumb 0″·22, third finger 2″, fifth finger 1″·4, tibia 0″·45, foot 0″·25.

Hab. Oriental Region; Peninsula of India (Darjiling); Tenasserim Province; Andaman Islands; Sumatra, Java, Philippine Islands.

In this species, as in *V. tylopus* also, the fleshy footpads without doubt enable the animal to cling to the under surfaces of large leaves and fruits—perhaps not so effectively, however, as the much more highly specialized pedunculated sucking-disks of *Thyroptera tricolor* from the American continent enable that animal to adhere to smooth surfaces as securely as a fly.

This species has been made by Dr. Peters the type of a new genus, *Tylonycteris*, distinguished by the large cushions on the base of the thumbs and soles of the feet, by the shortness of the thumbs and smallness of the thumb-nail, and by the remarkable flatness of the skull. The discovery by the writer (subsequently to the publication of the definition of this new genus) of similar adhesive cushions in other species of the genus *Vesperugo* not closely related to this species, renders this character of very little importance in a generic sense, especially as some of these species are evidently most closely allied in all other respects to species which have not a trace of these foot-pads (e.g. *V. blanfordi*); and the shortness of the thumbs and thumb-nail is, proportionally, as much pronounced in *V. noctula*, while the flatness of the skull appears to be nearly as well marked in *V. nasutus*.

a, *b*. ad. sks.	India.	T. C. Jerdon, Esq. [P.].
c. ♀ ad., al.	Darjiling.	G. E. Dobson, M.B. [E.].
d. ad. sk.		Purchased.
e. ♀ imm., al.	Luzon.	Dr. Meyer [C.].
f. skeleton.	? Java.	Purchased.

Inc. $\frac{2-2}{6}$, *pm.* $\frac{2-2}{2-2}$; *the first upper premolar minute, internal to the tooth-row; the second premolar close to the canine or separated by a narrow interval, through which the first premolar is rarely visible from without; ears short, triangular, not exceeding the head in length, the outer margin of the conch carried forward to the angle of the mouth; tragus shorter and broader than in* Vesperus; *postcalcaneal lobe generally well developed.* *Hab.* Eastern Hemisphere, one species only extending into the Western Hemisphere. Subgenus VESPERUGO.

Synopsis of the Species.

A. Thumb and feet simple, without adhesive cushions.
  a. Wings from the ankles or from the tibiæ higher up.
    a'. Tragus expanded above and curved inwards, reaching its greatest width above the middle of its inner margin.
      a''. Inner margin of the tragus deeply concave.
        a'''. Wings from the ankles; the extreme tip of the tail alone projecting from the interfemoral membrane; postcalcaneal lobe well developed.
          α. Fur unicoloured above; upper outer incisors double the size of the inner incisors in cross section at the base; lower incisors at right angles to the direction of the jaws; forearm 2″ to 2″·8 ..... 23. *V. noctula*, [p. 212.
          β. Fur bicoloured above; upper outer incisors equal to the inner incisors

in cross section at the base; lower incisors in the direction of the jaws; forearm 1″·8 ..... 24. *V. leisleri*, p. 215.

b‴. Wings from the tibiæ; the extreme tip of the tail alone projecting; postcalcaneal lobe well developed.

γ. Fur unicoloured; incisors as in *V. noctula*; forearm 1″·55 ..... [p. 216. 25. *V. stenopterus*,

b′. Tragus not expanded above, reaching its greatest width about the middle of its inner margin.

b″. Inner margin of the tragus deeply concave.

c‴. Wings from the base of the toes; the extreme tip of the tail alone free; postcalcaneal lobe small.

δ. Tragus crescent-shaped; upper outer incisors half the length of the inner incisors, but less than half their transverse diameter at the base; forearm 1″·35 ..... [p. 217. 26. *V. imbricatus*,

c″. Inner margin of the tragus straight or faintly concave.

d²‴. Wings from the base of the toes; last osseous caudal vertebra free.

d⁴. Outer upper incisors as long as (or slightly longer than) the outer cusp of the inner incisor; postcalcaneal lobe small.

ε. Outer margin of the ear convex in lower half, concave above; fur above deep black; forearm 1″·35 to 1″·6 ..... [p. 218. 27. *V. maurus*,

ζ. Outer margin of the ear straight; fur above brown; forearm 1″·55.. 28. *V. affinis*, p. 220.

e⁴. Outer upper incisors very short, as in *V. serotinus*; no postcalcaneal lobe.

η. Fur above deep black, the extremities of some hairs bright ferruginous; forearm 1″·5 ..... [p. 221. 29. *V. circumdatus*,

f⁴. Upper incisors as in *V. noctula*; postcalcaneal lobe well developed.

θ. Fur dark reddish brown above and beneath; lower incisors in the direction of the jaws; forearm 1″·5 ..... [p. 222. 30. *V. indicus*,

c′. The tragus reaches its greatest width slightly above the base of its inner margin.

e‴. Wings from the tarsi; extremity of the tail scarcely projecting.

g⁴. Outer upper incisor on each side not equalling the outer cusp of the inner incisor in vertical extent, and considerably less than it in cross section.

ι. Wings very short; the first upper premolar visible from without; forearm 1″·5 ..... [p. 223. 31. *V. brachypterus*,

f'''. Wings from the base of the toes.
aa'''. Postcalcaneal lobe distinct, generally well developed.
*g*⁴. Outer upper incisor on each side not equalling the outer cusp of the inner incisor in vertical extent.
κ. Outer margin of the ear-conch deeply concave above; forearm 1″·25 ..... 32. *V. pipistrellus*, [p. 223.
λ. Outer margin of the ear-conch straight or faintly concave above; forearm 1″·15 ..... 33. *V. tenuis*, p. 226.
*h*⁴. Outer upper incisor slightly exceeding the outer cusp of the inner incisor in vertical extent.
μ. Outer margin of the ear-conch straight; forearm 1″·35 ..... 34. *V. abramus*, [p. 226.
*i*⁴. Outer upper incisors minute.
*i*⁵. Tragus obtuse, inner margin straight.
ν. Upper third of the outer margin of the ear-conch slightly concave; tail much shorter than the head and body; interfemoral and part of the wing-membrane behind margined with white; forearm 1″·35 ..... 35. *V. kuhlii*, p. 230.
ξ. Upper third of the outer margin of the ear-conch deeply emarginate; tail as long as the head and body; no white margin to the membranes; forearm 1″·3 ..... 36. *V. maderensis*, [p. 231.
*j*⁵. Tragus attenuated upwards, acutely pointed, and curved inwards.
ο. Postcalcaneal lobe narrow; forearm 1″·9 ..... 37. *V. krefftii*, p. 232.
bb'''. No postcalcaneal lobe.
*j*⁴. Outer upper incisors minute.
π. Lower incisors in the direction of the jaws; forearm 1″·35..... 38. *V. pulcher*, [p. 233.
ρ. Lower incisors at right angles to the direction of the jaws; forearm 1″·15 ..... 39. *V. temminckii*, [p. 233.
*k*⁴. Outer upper incisors as long or nearly as long as the inner incisors.
σ. Outer upper incisor on each side parallel and close to the inner incisor; extreme tip of the tail projecting; forearm 1″·8 ..... 40. *V. annectens*, [p. 234.
τ. Outer upper incisor on each side directed vertically downwards, separated from the inner incisor, which is inclined inwards; the last osseous caudal vertebra quite free; forearm 1″·35..... 41. *V. georgianus*, [p. 235.

B. Base of the thumbs and soles of the feet with adhesive cushions; outer margin of the ear-conch terminating in a very distinct lobe.

ϕ. Outer margin of the ear-conch terminating in a round lobe; tragus with a small tooth-like projection at the base; outer incisors very short; forearm 1″·2..... 42. *V. tylopus*, p. 236.

χ. Outer margin of the ear-conch terminating in a square lobe; tragus without a projection at the base; outer incisors nearly as long as the inner ones; forearm 1″·2..... 43. *V. nanus*, p. 237.

23. Vesperugo noctula.

Vespertilio noctula, *Schreber, Säugeth.* i. p. 166, pl. 52 (1775); *Gmel. Linn. Syst. Reg. Anim.* i. p. 146 (1788); *Desmarest, Mammalogie* (1820), p. 136; *Temm. Monogr. Mamm.* ii. p. 169 (1835–41); *Jenyns, Brit. Vertebr.* p. 23; *Bonap. Fauna Ital.* fasc. xxi. (1837); *Bell's Brit. Quadrup.* p. 12, wdct. (1837); *De Sélys-Longch. Faune Belge*, 1842.

Vespertilio magnus, *Berkenhout, Synop. Nat. Hist. Gt. Brit. & Irel.* p. ii (1789).

Vespertilio altivolans, *White, Nat. Hist. Selborne* (1789).

Vespertilio serotinus, *Geoff. Ann. du Mus.* viii. p. 194 (1806).

Vespertilio proterus, *Kuhl, Wetter. Ann.* iv. p. 41 (1817).

Vespertilio labiata, *Hodgson, Journ. Asiat. Soc. Beng.* iv. p. 700 (1835).

Scotophilus noctula, *Gray, Mag. Zool. & Bot.* ii. p. 497 (1838).

Vesperugo noctula, *Keys. & Blas. Wiegm. Archiv*, 1839, p. 317; *Wirbelth. Europ.* p. 46; *Wagner, Suppl. Schreb. Säugeth.* v. p. 728 (1855); *Blasius, Fauna Deutschl.* p. 53, wdct. p. 54 (1857); *Lilljeborg, Sver. Norges Ryggradsdjur*, p. 134 (1874); *Dobson, Monogr. Asiat. Chiropt.* p. 88 (1876).

Vespertilio macuanus, *Peters, Reise nach Mossambique, Säugeth.* p. 61 (1852).

Noctulinia noctula, *Jerdon, Mamm. of India*, p. 36 (1867).

Head broad and very flat, the labial glandular prominences well developed, adding much to the breadth of the muzzle; posteriorly the raised rounded edge of these prominences forms the anterior margin of a deep furrow, beyond which the long hair covering the head does not pass. Nostrils placed rather widely apart, with a slightly concave intervening space, their inner edges scarcely projecting. Ears nearly as broad as long; the base of the inner margin very convex forwards, the ascending part straight, the tip very broadly rounded off, the outer margin convex and reflected backwards, forming in front of the tragus a thickened convex lobe terminating close to the angle of the mouth. Tragus short and curved inwards above; at the base of the outer margin a small triangular projection succeeded by a concavity; and above this the outer margin becomes very convex, the inner margin correspondingly concave.

Thumb short, with a short but acutely-pointed claw; at the base of the phalanx a small callosity. Feet thick; toes short, about half the

length of the foot. Wing-membranes attached to the ankles. Post-calcaneal lobe large, semicircular, placed on the calcaneum at a distance from the tibia equal to the breadth of the foot. The last rudimentary caudal vertebra free.

Fur, above and beneath, bright yellowish brown, the hairs paler towards their bases.

Above, the fur of the body extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the knee-joint; the wing-membrane is covered nearly as far as a line drawn from the middle of the humerus to the knee-joint; the interfemoral membrane is clothed nearly as far back as the middle of the tibia; in front the inner side of the ear is covered with short fine hairs, which also appear upon the tragus, and a few upon the reflected outer margin of the conch; beneath, the wing-membrane is rather thickly clothed as far as a line drawn from the elbow to the knee-joint; and a broad band of fine short hairs passes outwards behind the forearm to the carpus*. On the interfemoral membrane the fur extends slightly further than upon the upper surface, but is much shorter.

Inner upper incisor on each side unicuspidate in old individuals, but in those just adult there is a second small cusp placed externally and posteriorly near the extremity of the tooth; the outer incisor short, its summit directed inwards towards the inner incisor, its base nearly double the transverse diameter of that tooth, grooved and hollowed out on the outer side so as to receive in the closed position of the jaws the summit of the cusp of the lower canine (Plate XIII. fig. 2*a*); lower incisors crowded, overlapping. First upper premolar very small, in the inner angle between the closely approximated canine and second premolar; last upper molar triangular in cross section, equal to half the antepenultimate molar in diameter from before backwards; the second lower premolar slightly higher than the first, and about half the size of the canine (Plate XIII. fig. 2).

Hab. Palæarctic, Ethiopian, and Oriental Regions, extending from England to Japan, and from the Scandinavian Peninsula to Southern Africa. In Europe generally distributed; in Asia extending from Western Turkestan along the Himalayas and other mountain-ranges to Ceylon, and through the Malay Peninsula to Sumatra and Java; in Africa recorded from the northern parts and from Mozambique, it is probably widely distributed throughout the high lands of that continent.

The distribution of this species is therefore very wide, and only exceeded by that of the Serotine (*V. serotinus*).

(For measurements, see Table, p. 216.)

a. ♀ ad., al.	Cambridgeshire.	Rev. L. Jenyns [P.].
b. ♀ ad., al.	Stuttgart.	Dr. Günther [P.].
c, *d*. ♀ ad., al.	Spain.	Lord Lilford [P.].
e. skeleton.	England.	Purchased.

* See an excellent representation of this distribution of the fur upon the wing-membrane of *V. lasiopterus* in Schreber, Säugethiere, i. pl. lviii. B.

f–i. ad. aks.	Europe.	
j. ad. sk.	Algiers.	Purchased.
k. ♂ ad., al.	Nipal.	B. H. Hodgson, Esq. [P.].
(Type of *Vespertilio labiata*, Hodgson.)		
l. ad. sk.	Ceylon.	Zool. Soc. Coll.
m. ad. sk.	Singapore.	Purchased.
(*Noctulinia malaccensis*, Gray.)		
n–p. ♂ & ♀ ad., al.*	Chefoo, China.	R. Swinhoe, Esq. [C.].
q–w. ♂ & ♀ al.		M. Lidth de Jeude.
x, y. ♀ ad., al.		M. Lidth de Jeude.
z–d'. skulls.	Stuttgart.	Dr. Günther [P.].
e'. skeleton.	Stuttgart.	Dr. Günther [P.].
f'. skull of *j.*		
g'. skull.	England.	Mr. Yarrell's Coll.
h'. skull.	No history.	
i'. skeleton.	West Africa.	Purchased.

Var. *a* (*Vesperugo lasiopterus*).

Vespertilio lasiopterus, *Schreber, Säugethiere*, pl. lviii. B (1775).
Vespertilio molossus, *Temm. Monogr. Mamm.* ii. p. 269 (1840).
Vesperugo molossus, *Wagner, Suppl. Schreb. Säugeth.* v. p. 738 (1855); *Peters, MB. Akad. Berl.* 1868, p. 639; *Dobson, Monogr. Asiat. Chiropt.* p. 90 (1876).

In form and colour of the fur almost quite similar to *V. noctula*, but differing remarkably in its much greater size and in the extent of hair upon the wings. Ears and tragus precisely as in *V. noctula*, but very much larger, and the upper half of the surface of the conch and the flattened and reflected external margin thickly covered with erect hairs; the glandular prominences of the muzzle are greatly developed, and are covered with long straight hairs, which also extend along the lips (Plate XII. fig. 4).

The fur of the abdomen extends upon the wing-membrane very densely as far as a line drawn from the knee to the elbow, and thence outwards posterior to the forearm to the proximal fourth of the metacarpal bone of the third finger; along the fifth metacarpal bone the wing-membrane is covered for nearly one inch in breadth; above and beneath, the interfemoral membrane is densely covered

* These specimens from Chefoo, although undoubtedly referable to this species, differ from all other specimens I have ever seen in the following respects:—The outer margin of the ear is very slightly folded backwards, the tragus is larger, and the triangular lobe at the base of its outer margin very acute. The prominences between the nostrils and eyes are much less developed, and the inner margins of the nasal apertures project. Foot smaller and much more slender; the postcalcaneal lobe triangular, not rounded behind. Fur very dark brown, with shining tips throughout. Lower incisors smooth, not trifid.

The completely ossified condition of the extremities of the finger-bones, and the development of the pectoral teats, as well as the slightly worn condition of the teeth, show that the specimens are quite adult.

Length, head and body 2″·8, tail 2″, head 0″·85, ear 0″·65, tragus 0″·25, breadth of tragus 0″·2, length of forearm 2″, thumb 0″·28, third finger 3″·65, fifth finger 2″, tibia 0″·75, foot 0″·4.

with hair as far as the end of the third caudal vertebra; above, the wing-membrane is covered as far as a line drawn from the knee to the middle of the humerus.

Teeth as in *V. noctula*; the small first upper premolar often absent.

Hab. Japan; China.

There can be little doubt that the excellent full-sized figures in Schreber's work, referred to above, were taken from this variety of the Noctule. They correspond in all respects in measurements, and could never have been intended to represent the common form of *V. noctula*, which, indeed, is drawn of the natural size in plate lii.

(For comparative measurements of *V. noctula*, *V. lasiopterus*, and of *V. leisleri*, see Table, p. 216.)

a. ♂ ad., al. M. Lidth de Jeude.

24. Vesperugo leisleri.

Vespertilio leisleri, *Kuhl, Ann. Wetterau. Gesellsch. Naturk.* 1819, Bd. i. p. 47.

Vesperugo leisleri, *Keys. & Blas. Wirbelth. Europ.* p. 46; *Fauna Deutschlands*, p. 56, figs. 35, 36 (1857); *Dobson, Monogr. Asiat. Chiropt.* p. 91 (1877).

Very similar to *V. noctula*, appearing on a superficial examination to be but a small form of that species. It is, however, easily distinguished by the colour of the fur and by the relative size of the inner and outer upper incisors.

In *V. noctula* the fur is unicoloured above and beneath, or the colour of the hairs is slightly paler towards their bases, while in this species the terminal one fourth of the hairs above is bright yellowish brown, beneath light brown, the basal three fourths of the fur on both surfaces dark brown. The outer incisor, also, in this species is equal to the inner incisor in cross section at its base, but in *V. noctula* it is double the size of the same tooth at its base. The lower incisors stand in the direction of the jaws, in *V. noctula* they are crowded and parallel.

Hab. Europe and the temperate regions of Asia, probably generally distributed throughout the warmer parts of the Palæarctic Region. Recorded from Ireland, England, France, Germany, Middle Russia, and the Ural, extending also from Madeira and the Azores through the Alps and other mountain-ranges to the Himalayas.

a, b. ♂ & ♀ ad., al.	Co. Armagh, Ireland.	R. M. Barrington, Esq. [P.].
c. ad. sk.	Warwickshire.	R. F. Tomes, Esq. [P.].
d. ad. sk.	England.	W. E. Leach, M.D. [P.].
e. ♂ ad., al.	Azores.	F. Godman, Esq. [P.].
f. ad sk.	Madeira.	A. Hally, Esq. [P.].
g. skull of *c*.		

Table showing comparative measurements of *Vesperugo leisleri*, *V. noctula*, and *V. lasiopterus*.

	Length, head and body.	tail.	head.	ear.	tragus.	forearm.	thumb.	3rd finger.	5th finger.	tibia.	foot.
	"	"	"	"	"	"	"	"	"	"	"
V. leisleri	2·3	1·65	0·7	0·6	0·2	1·5	0·25	2·7	1·8	0·65	0·3
V. noctula	3·0	2·0	0·9	0·75	0·25	2·0	0·3	3·7	2·1	0·75	0·45
V. lasiopterus	3·9	2·45	1·1	0·9	0·3	2·8	0·35	4·7	3·0	0·9	0·6

25. Vesperugo stenopterus.

Vesperugo stenopterus, *Dobson*, *P. Z. S.* 1875, p. 470; *Monogr. Asiat. Chiropt.* p. 91 (1876).

Crown of the head very slightly elevated, almost level with the face-line; muzzle broad and flat; labial glandular prominences largely developed, the upper lip symmetrically thickened. Ears short, triangular; the distance between the base of the inner margin and the termination of the outer margin near the angle of the mouth, directly in a line below the eye, is equal to the distance from the base of the inner margin to the summit of the ear; integument forming the conch very thick, especially the lower half of the outer side; tragus short, broad above, narrow opposite the base of the inner margin, with a triangular lobe at the base of the outer margin.

Thumb rather long; feet wholly free from the wing-membrane, which is attached to the tibia a short distance above the ankle; postcalcaneal lobe small; termination of calcaneum indistinct; tip of tail free (Plate XIII. fig. 1).

Fur very short, dark brown throughout; integument and membranes dark brown or black.

The muzzle in front of the eyes, both above and beneath, is almos naked; the ear-conch has some short hairs upon the upper portiort On the dorsal surface the base of the interfemoral alone is covered, and the fur of the body extends upon the interfemoral membrane along the sides of the body only; beneath, the antebrachial membrane has a few hairs: the wing-membrane is covered as far as a line drawn from the elbow to the knee-joint, and a band of short hairs passes outwards to the carpus posterior to the forearm; the legs and feet appear quite naked.

Upper inner incisor, on each side, directed very obliquely forwards, with a second cusp placed posteriorly and externally near its extremity; outer incisor small, triangular, unicuspidate, parallel and close to the outer side of the base of the inner incisor, the cingulum of which it but slightly exceeds in vertical extent; second premolar separated by a narrow space (wider in immature specimens), through which with difficulty the small internal first premolar may be seen; lower incisors crowded in immature specimens*, the sides overlapping; in adults placed in the direction of the jaws, the central and the middle incisor on each side very broad in transverse and narrow in antero-posterior diameter, trifid; the outer incisors conspicuously larger than the others, and much exceeding them in antero-posterior diameter†; lower premolars equal in vertical extent, but the first is in cross section at the base nearly twice the diameter of the second.

Length, head and body 2″·35, tail 1″·7, head 0″·75, ear 0″·6 × 0″·4, tragus 0″·23 × 0″·15, forearm 1″·55, thumb 0″·32; third finger—metacarp. 1″·5, 1st ph. 0″·6, 2nd ph. 0″·7; fourth finger—metacarp. 1″·48, 1st ph. 0″·5, 2nd ph. 0″·3; fifth finger—metacarp. 1″·3, 1st ph. 0″·28, 2nd ph. 0″·2; tibia 0″·55, foot 0″·45.

Hab. Borneo (Sarawak).

In this species the fourth and fifth fingers, compared with the third, are relatively shorter than in any other species of the genus; and as the wing-membrane extends only to the distal third of the tibia, the wings are remarkably narrow.

a. ♂ ad., al. (type).	Sarawak.	Mr. Everett [C.].
b. ♂ imm., al.	Sarawak.	Mr. Everett [C.].

26. Vesperugo imbricatus.

Vespertilio imbricatus, *Horsfield, Zoolog. Researches in Java* (1824).
Vespertilio macrotis, *Temminck, Monogr. Mammal.* ii. p. 218 (1835–41).
Vesperugo imbricatus, *Dobson, Monogr. Asiat. Chiropt.* p. 93 (1876).

Ears as long as the head or slightly longer, broadly rounded off above; the basal lobe of the inner margin rounded, the ascending portion slightly convex; the upper third of the outer margin flattened, the middle third slightly convex, faintly emarginate opposite the base of the tragus, and terminating close to the angle of the mouth in a distinct lobe. The tragus is peculiarly shaped and characteristic of this species; in general form regularly crescent-shaped, with a large triangular projection at the base of its outer margin; the inner margin is regularly and rather deeply concave,

* The original description of the teeth of this species was taken from an immature specimen in the collection.

† Blasius (Fauna Deutschlands) makes use of the position of the lower incisors in the jaw as one of the most important characters in distinguishing species. The different arrangement, however, of these teeth in immature and adult specimens of *V. stenopterus*, noted above, throws much doubt on the value of this character in other species.

the outer margin correspondingly convex, meeting the inner margin at an acute point directed inwards, forming the superior cornu of the crescent. The tragus reaches its greatest width slightly below the middle of the inner margin. Glandular prominences between the eyes and nostrils well developed, causing a slight hollow on the muzzle above.

Wings to the base of the toes; postcalcaneal lobe small, indistinct; tip of tail projecting; toes rather more than half the length of the foot, armed with feeble claws.

The distribution of the fur upon the wing- and interfemoral membranes is similar to that in *V. abramus*.

Above dark brown; beneath similar, with slightly ashy tips.

Upper inner incisors long, bifid, slanting considerably inwards; outer incisors unicuspidate, acutely pointed, half the length of the inner incisors, but less than half their transverse diameter.

Lower incisors slightly crowded, equal in size, and distinctly trifid. Second upper premolar very close to the canine; first upper premolar very small, its summit scarcely elevated above the gum, crushed in between the canine and second premolar, and not visible from without. First lower premolar acutely pointed, equal to three fourths the second premolar; second premolar nearly equal to the canine in vertical extent.

Length (of a ♀ specimen in alcohol), head and body 1″·8, tail 1″·5, head 0″·55, ear 0″·6, tragus 0″·22 × 0″·12, forearm 1″·35, thumb 0″·28, third finger 2″·3, fifth finger 1″·75, tibia 0″·55, foot 0″·25.

Hab. Malay Peninsula (Malacca); Java.

a. ad. sk., in al. Malacca.
b. ♂ ad., al. Purchased.

27. Vesperugo maurus.

Vesperugo maurus, *Blasius, Wiegm. Archiv*, 1853, p. 35; *Fauna Deutschl.* p. 67, figs. 43, 44 (1857); *Dobson, Monogr. Asiat. Chiropt.* p. 99, figs. *a*, *b* (1876).
Scotophilus darwini, *Tomes, P. Z. S.* 1859, p. 70.
Vesperugo mordax, *Peters, MB. Akad. Berl.* 1866, p. 402.
Vesperugo pulveratus, *Peters, P. Z. S.* 1870, p. 617.
Pipistrellus austenianus, *Dobson, P. A. S. B.* 1871, p. 213.

Muzzle broad and flat above, the glandular prominences on each side well developed, increasing the width of the muzzle; nasal orifices opening almost on a level with the front surface of the muzzle, without intervening emargination. Ears broad, triangular, broadly rounded off above; the outer margin straight above for nearly half its length, then slightly convex to the base, terminating midway between the base of the tragus and the angle of the mouth in a small lobe; tragus broad, reaching its greatest breadth above the middle of the inner margin, at the base of the outer margin a distinct triangular lobule, succeeded above, immediately below the middle

of the outer margin, by a second but very small projection, indistinct in some specimens; inner margin straight, outer margin parallel to the inner margin, convex above.

Toes about half the length of the whole foot; last caudal vertebra free, or the last and half the antepenultimate vertebra free, especially in the smaller specimens of this species from higher latitudes.

The fur of the body is rather long and dense. In front it extends forwards upon the face as far as a line drawn between the eyes; behind, it projects over the base of the interfemoral membrane, but does not extend upon it; laterally it covers a very narrow portion of the wing-membrane, above and beneath, along the sides of the body. The interfemoral membrane is naked above, with the exception of a few fine and almost invisible hairs placed along the first and second vertebræ; beneath, it is covered for more than two thirds its extent with short greyish hairs, thickest at the root of the tail.

Above and beneath deep black or very dark brown, the extreme tips of the hairs on the posterior half of the back greyish, so that the fur here appears minutely powdered over with white; beneath, the tips of all the hairs are greyish. Cutaneous system black; the nose, ears, and naked glandular prominences of the upper lip are intensely black.

Upper incisors nearly equal in length; the inner incisor on each side bifid, its outer and shorter cusp directed slightly backwards, and in a plane posterior to the outer incisor, which equals or somewhat exceeds it in vertical extent; lower incisors crowded, overlapping; first upper premolar small, quite internal to the tooth-row, in the small northern forms not visible, but in the larger animals from Southern Asia visible from without; second premolar close to the canine.

Length, head and body 1″·9, tail 1″·3, tail free from membrane 0″·12, ear 0″·62, tragus 0″·23, forearm 1″·35, thumb 0″·25, third finger 2″·2, fifth finger 1″·6, tibia 0″·55, foot 0″·3.

Specimens from India and Java are conspicuously larger, and have forearms and tails 1″·6 long; the extremities of the tails also do not project so much as in the smaller examples of this species from higher latitudes. (See my remarks on this species in Monogr. Asiat. Chiropt. p. 101.)

Hab. The Palæarctic and Oriental Regions, extending from the Canary Islands (Palma, Teneriffe) and Middle Europe (Switzerland, the Tyrol) to China (Pekin, Amoy, Cochin China), India (Khasia Hills), and the Malay Archipelago (Java).

a. ♀ ad., al.	Palma.	Rev. R. T. Lowe [P.].
	(Type of *Scotophilus darwini*, Tomes.)	
b. ♂ ad., al.	Teneriffe.	Cambridge Museum.
c. ad. sk.	Amoy, China.	R. Swinhoe, Esq. [P.].
	(Type of *Vesperugo pulveratus*, Peters.)	
d. skull.	Deccan, India.	

28. Vesperugo affinis.

Pipistrellus affinis, *Dobson, Proc. Asiat. Soc. Beng.* 1871, p. 213.
Vesperugo affinis, *Dobson, Monogr. Asiat. Chiropt.* p. 102, figs. *a*, *b* (1876).

Head flat; glands of the upper lip so developed as to cause a deep depression between them on the face behind the nostrils. Measured from behind, the ears are as broad as long; their inner margins are convex, and the tips broadly rounded; the outer margin of the ear extends from the tip to its termination near the angle of the mouth without emargination, and without forming a lobe of any kind; from the angle of the mouth it is separated by a small wart covered with long hairs. The tragus is of the shape so common in the species of this subgenus; its inner margin is straight, its outer convex upwards; and at its base the usual small triangular lobe is placed. The nostrils open sublaterally; and in the centre of the slightly emarginate space between them a narrow ridge passes down to the upper lip, as in the greater number of species of the section of the genus to which this belongs.

The wing-membrane is attached to the base of the outer toe, which is shorter than the others. The tail is long, of nine vertebræ, the last free. The feet are small, the toes slender and almost naked.

Above, the fur of the head extends upon the face, above the eyes, as far as the glandular prominences of the upper lip; the remaining parts of the face are almost naked; anteriorly the ear-conch has a few fine scattered hairs; posteriorly about half the posterior surface from the base upwards is densely covered. The distribution of the fur upon the wing-membranes is very limited on the upper surface, being confined to a narrow space along the sides of the body; beneath, its extent is greater, and a few fine greyish hairs are ranged along parallel lines nearly as far outwards as a line joining the elbow- and knee-joints. The fur of the body does not extend upon the interfemoral membrane, which has but a few almost invisible hairs scattered over the anterior half of the upper surface, and is covered beneath by very fine short greyish hairs, arising from the dots on the transverse dotted lines.

On the upper surface chocolate-brown, lighter on the head and neck; beneath, dark brown, with light brown or ashy tips; on the pubes and along the thighs dirty white or very pale buff.

Incisors nearly equal in vertical extent; outer incisors acutely pointed; first upper premolar minute, acutely pointed, placed inside the line of teeth and not distinguishable from without.

The single specimen, an adult female preserved in spirit, from which the above description is taken was obtained by Dr. Anderson at an elevation of about 4500 feet, at Bhamo, Yunan.

Length, head and body 1″·9, tail 1″·65, head 0″·75, ear 0″·6, tragus 0″·25, forearm 1″·55, thumb 0″·25, third finger 2″·8, fifth finger 2″, tibia 0″·6, foot 0″·3.

Hab. Bhamo, Yunan.

This species is closely allied to *V. maurus*, which it resembles in

dentition and in the free last caudal vertebra; but it is readily distinguished by the straight outer margin of the ear-conch, by the colour and distribution of the fur, and by the large number of caudal vertebræ.

Type in the collection of the Indian Museum, Calcutta.

29. Vesperugo circumdatus.

Vespertilio circumdatus, *Temminck, Monogr. Mammal.* ii. p. 214 (1835–41).

Vesperugo circumdatus, *Wagner, Suppl. Schreb. Säugeth.* v. p. 738 (1855).

Ears shorter than the head, obtuse, rounded off above; the inner margin of the conch very convex in the lower half, straight in upper, upper third of the outer margin concave beneath the obtuse extremity, then convex, emarginate opposite the base of the tragus, terminating in a convex lobe, the upper margin of which is *not* notched; the tragus reaches its greatest width about the middle of its inner margin, then sloping inwards to form with the inner margin an acute angle; inner margin slightly concave, a rounded lobule at the base of the outer margin; nostrils scarcely projecting, opening sublaterally with a concave space between.

Wings from the base of the toes; no postcalcaneal lobe; half the last caudal vertebra free.

The fur is very peculiar and characteristic of the species. Above, intensely black, the extremities of some of the hairs bright ferruginous, more apparent by reflected light; beneath, dull black; the extremities of most of the hairs shining greyish or ashy; fur very long and very dense, extending upon the face in front of the eyes, leaving the terminal third of the muzzle half naked; the base of the ears behind covered, a small tuft of hairs in front of the base of the tragus. Wings almost naked, no band of hairs posterior to the forearm; the basal third of the upper surface of the interfemoral membrane with rather short black hairs; legs naked.

Integument black. Temminck mentions that the black ears are margined by white, but I have not observed the white border in the type in the Leyden Museum; it is probably more apparent in recent specimens.

Upper incisors like those of the Serotine; the inner incisors long and strong, faintly bifid at their extremities; the outer incisor on each side very small, close to the outer and anterior part of the base of the inner incisor, with a weak oblique cusp; first upper premolar very small, in the inner angle between the closely approximated canine and second premolar; lower incisors at right angles to the direction of the jaws.

Skull slightly vaulted and raised above the face-line; a rather deep longitudinal groove in the frontal, with prominent but short and blunt postorbital processes.

Length (of the type specimen), head and body about 2″·4, tail

1″·3, ear 0″·5, tragus 0″·22, forearm 1″·5, thumb 0″·2, third finger 3″, fifth finger 1″·85, tibia 0″·5, foot 0″·4.

Hab. Peninsula of India; Java.

Type in the collection of the Leyden Museum.

V. circumdatus may be at once distinguished from all the nearly allied species of this genus by the intensely black colour of the fur, similar black fur being present in a few other species only of Vespertilionidæ.

a. ad. sk. India. T. C. Jerdon, Esq. [P.].

30. Vesperugo indicus.

About the size of large specimens of *V. maurus*, which it resembles also in the form of the head and ears.

Ears short, triangular; the outer margin of the ear-conch straight almost from the tip to its termination at a short distance behind the angle of the mouth; tragus broad, with a straight inner and almost evenly convex outer margin, at the base of which there is a distinct triangular lobe; muzzle broad in front, the margins of the nostrils scarcely projecting.

Wings from the base of the toes; postcalcaneal lobe well developed, semicircular; the extreme tip of the tail alone projecting.

Fur dark reddish brown above and beneath, the extremities of the fur beneath slightly paler. The wing and interfemoral are clothed only along the sides of the body. Ears and membranes dark brown or black.

The upper incisors are very similar to those of *V. noctula*; the inner incisor on each side is bifid at its extremity, and is exceeded in cross section at the base by the outer incisor, which has an oblique internal cusp not equalling the outer cusp of the inner incisor in vertical extent; the outer side of the outer incisor is hollowed out to receive the extremity of the lower canine when the jaws are closed; first upper premolar quite internal to the tooth-row, not visible from without; the second upper premolar almost touching the canine; lower incisors in the direction of the jaws.

Length (of an adult ♂), head and body 2″·1, tail 1″·7, head 0″·65, ear 0″·6, tragus 0″·25, forearm 1″·5, thumb 0″·28, third finger 2″·7, fifth finger 1″·9, tibia 0″·55, foot 0″·35.

Hab. India (Mangalore, Malabar coast; Madras).

Two specimens of this species, an adult and an immature male, were sent to the writer from Mangalore by Dr. A. F. Dobson. The immature specimen still retains the milk dentition, but the forearm measures 1·3 inch, more than that of adult individuals of *V. abramus* from the same locality.

V. ceylonicus, Kelaart (Prodr. Faunæ Zeylanicæ, p. 22), may be identical with this species, as the description and most of the measurements correspond closely; but the outer upper incisors are described as having two or three cusps, and the length of the tibia

is given as 0·7 inch. As the type appears to have been lost, it is now impossible to recognise Kelaart's species with certainty.

a. ♂ imm., al.	Mangalore.	G. E. Dobson, M.B. [E.].
b. ad. sk.	Madras.	Sir Walter Elliot [P.].

31. Vesperugo brachypterus.

Vespertilio brachypterus, *Temminck, Monogr. Mammal.* ii. p. 215, pl. 53. figs. 5, 6; *Wagner, Suppl. Schreb. Säugeth.* v. p. 744.
Vesperugo brachypterus, *Dobson, Monogr. Asiat. Chiropt.* p. 92 (1877).

Head flat; muzzle broad, obtuse; glandular prominences smooth, rounded, naked; ears triangular, rounded off evenly above, the outer margin straight, the distance between the bases of the inner and the outer margins less than the distance between the base of the inner margin and the summit of the ear; the tragus reaches its greatest breadth opposite the base of its inner margin, thence narrower upwards and inwards, obtusely pointed and inclined inwards.

Wing-membrane from the ankle or tarsus; extremity of the tail scarcely projecting.

Fur short, on the upper surface scarcely extending to the membranes; beneath, covering the wing-membrane thinly as far as a line drawn from the elbow to the distal third of the femur. Above, dark brown; beneath, reddish brown with a yellowish tinge.

Inner upper incisors long, with a second cusp placed posteriorly and externally; outer incisor on each side not equal in length to the outer cusp of the inner incisor, and in transverse section in the middle not equal to one third the inner incisor; lower incisors next canines larger than the others, middle incisors slightly overlapped by the outer edges of the inner incisors; first lower premolar slightly longer, and in transverse diameter nearly double the second, also nearly equal to the lower canine in vertical extent; second upper premolar separated from the canine by a rather wide space, through which the small internal first premolar is distinctly visible.

Length, head and body 2″·1, tail 1″·2, head 0″·7, ear 0″·55, base of the inner margin to summit of ear-conch 0″·33, tragus 0″·2, forearm 1″·5, thumb 0″·3, tibia 0″·55, foot 0″·4.

The above measurements have been taken from a specimen in the Berlin Museum, which does not appear quite adult; the measurements of the short wings have therefore been omitted.

Hab. Java, Sumatra, Banca.

32. Vesperugo pipistrellus.

Vespertilio pipistrellus, *Schreb. Säugeth.* i. p. 167, pl. 54 (1775); *Erxleb. Syst. Regne Anim.* p. 148 (1777); *Gmel. Linn. Syst. Natur.* p. 48 (1788); *Geoffroy, Descript. de l'Egypte*, ii. p. 116 (1812); *Kuhl, Wetter. Ann.* iv. p. 53 (1817); *Desmarest, Mammal.* p. 139 (1820); *Jenyns, Trans. Linn. Soc.* xvi. p. 163; *Bell's Brit. Quadr.* p. 31 (1837); *Bonap. Faun. Ital.*; *Temminck, Monogr. Mamm.* ii. p. 194, pl. 48 (1840).
Vespertilio pygmæus, *Leach, Zool. Journ.* i. p. 560 (1825); *Bell, British Quadrupeds*, p. 31 (with a woodcut) (1837).

Scotophilus murinus, *Gray, Mag. Zool. & Bot.* ii. p. 497 (1838).
Vespertilio lacteus, *Temminck, l. c.* p. 245.
Vesperugo pipistrellus, *Keys. & Blas. Wiegm. Archiv*, 1839, p. 321; *Wirbelth. Europ.* p. 49 (1840); *Fauna Deutschl.* p. 61, figs. 39, 40 (1857); *Wagner, Suppl. Schreb. Säugeth.* p. 730 (1855); *Dobson, Monogr. Asiat. Chiropt.* p. 95 (1876).
Kerivoula grisea, *Gray, Ann. & Mag. Nat. Hist.* x. p. 258 (1842).

Muzzle obtuse, glandular prominences well developed, causing a considerable depression between them and the crown of the head, not easily perceived, however, in the living animal, owing to the length of the fur in this situation; the nostrils open almost directly forwards. Ears broadly triangular, rounded at the tips; a concavity, occupying rather more than one third of the upper part of the outer margin, commences beneath the broadly rounded summit of the ear; the outer side then becomes abruptly convex, again slightly concave opposite the base of the tragus, and terminates in a convexity which supports about the middle a small rounded lobe directed upwards. The tragus is rounded off towards the inner margin above, the outer margin convex and sloping inwards in its upper third, the inner margin straight or slightly concave; the outer margin has a triangular lobule above the base, not succeeded by an emargination, and then becomes parallel to the inner margin.

Feet small; wings to the base of the toes; postcalcaneal lobe well developed, rounded, placed on the calcaneum at a distance from the end of the tibia equal to half the length of the foot; last rudimentary caudal vertebra free.

The head and face, as far as the glandular prominences of the muzzle, are densely covered with hair; in front the muzzle is clothed with short fur, interspersed with a few long straight hairs. The body is densely covered with rather long fur, black at the base and for half the length of the hairs, the remaining half light brown, or, in specimens inhabiting sandy districts, ashy, causing the fur to appear almost white throughout; beneath, about three fourths of the length of the hairs is black, the remaining part to the tips more or less ashy, sometimes with a yellowish or canary-colour tinge, especially during the breeding-season; in others the colour of the fur beneath scarcely differs from that above.

On the upper surface the fur of the body extends thickly upon the wing-membrane as far as a line joining the middle of the humerus and the knee-joint; on the interfemoral it extends nearly as far as a line drawn between the ankles when the tail and interfemoral membrane are extended; beneath, the wing-membrane is covered as far as a line joining the elbow- and knee-joints; the fur of the body passes upon the interfemoral at the root of the tail only and along the inner sides of the thighs, about half the remaining portion is covered with very fine short hairs, extending principally along the tail.

The upper incisor on each side is long and bifid, the lesser cusp external; the outer incisor as long or slightly longer than the outer cusp of the inner incisor in fully adult individuals; in older specimens

the point becomes worn or the inner incisor grows longer, and it is then slightly or considerably shorter. The length of this incisor, however, is variable within a short compass; and I have found it in the same individual shorter than the outer cusp of the inner incisor on one side of the mouth, and longer than it on the other. Lower incisors very slightly crowded, in the direction of the jaws. The second upper premolar is separated by a small space from the canine, and through this interval the summit of the small internal first premolar is visible, which is larger than in *V. abramus*.

Length, head and body 1″·65, tail 1″·4, head 0″·55, ear 0″·45, tragus 0″·22, forearm 1″·25, thumb 0″·22, third finger 2″·1, fifth finger 1″·55, tibia 0″·45, foot 0″·22.

Hab. The Palæarctic Region, apparently generally distributed.

V. lacteus, Temminck, which I have identified with this species, was founded on two specimens from an unknown locality, which the describer thought was probably South America, as they were discovered in a collection made in that region. These specimens, which are preserved in the collection of the Leyden Museum, agree in all respects in structure and in the colour of the fur with specimens of *V. pipistrellus* from the sandy deserts of Eastern Turkestan; and it is probable that this species has always very pale-coloured fur when inhabiting dry sandy districts, as has been observed under similar conditions in other species of Bats, as in *V. kuhlii* and *V. serotinus*. The same remarks apply to *Kerivoula grisea*, Gray (also from unknown locality), which I cannot distinguish from this species.

a. ♀ juv., al.	Surbiton.	Dr. Günther [P.].
b. ♀ ad., al.	England.	Purchased.
c. ad., al.	Netley, Hampshire.	G. E. Dobson, M.B. [P.].
d. imm. sk.	Dartmoor.	W. E. Leach, M.D. [P.].
(Type of *Vespertilio pygmæus*, Leach.)		
e. ♂ ad., al.	Co. Longford, Ireland.	G. E. Dobson, M.B. [P.].
f. ad. sk.	Europe.	Leyden Museum [P.].
g. ad. sk.	Hamburg.	Dr. J. E. Gray [P.].
h–k. ♂ & ♀ ad., al.	Bonn.	Dr. Günther [P.].
l, m. ♂ & ♀ ad., al.	Tübingen.	Dr. Günther [P.].
n, o. ♂ ad., al.	Berlin.	Dr. Günther [P.].
p. ♀ ad., al.	Transylvania.	Messrs. Danford & Browne [P.].
q. ♂ ad., al.	Sicily.	
r. ♂ juv., al.	Sicily.	
s, t. ♂ & ♀ ad., al.	Malta.	Capt. Feilden [P.].
u. ad. sk.	Madeira.	O. Blewitt, Esq. [P.].
v, w. ♂ & ♀ ad.	? Gaboon.	Purchased.
x–a'. ♂ & ♀ ad., al.	No history.	
b'. ad. sk.		Zool. Soc. Coll.
c'. ♀ ad., al.		Purchased.
d'. ♀ ad., al.		M. Lidth de Jeude.
e'. ad. sk.		
f'. ♀ juv., al.		
g'. ♂ imm., al.	(Type of *Kerivoula grisea*, Gray.)	
h'. skull.	England.	Mr. Yarrell's Collection.
i', j'. skulls.	Berlin.	Dr. Günther [P.].
k'–n'. skeletons.	England.	Purchased.

33. Vesperugo tenuis.

Vespertilio tenuis, *Temm. Monogr. Mamm.* ii. p. 229, pl. 57. figs. 5–7 (1835–41).

Vesperugo tenuis, *Wagner, Suppl. Schreb. Säugeth.* v. p. 740 (1855); *Dobson, Monogr. Asiat. Chiropt.* p. 98 (1876).

Ears smaller than those of *V. pipistrellus*; tragus rather broad and short, attaining its greatest breadth slightly below the middle of the inner margin; muzzle broad and conical, nearly naked.

Feet rather large; wings to the base of the toes; postcalcaneal lobe distinct, not deep; extreme tip of the tail projecting.

Upper inner incisors sloping considerably inwards and forwards, bifid at the extremity, the outer incisor on each side slender and shorter than the outer cusp of the inner incisor; lower incisors not crowded, in the direction of the jaw; second upper premolar separated by a small interval from the canine; the first small internal premolar almost concealed by the canine.

Length, head and body 1″·65, tail 1″, head 0″·55, ear 0″·42, tragus 0″·18, forearm 1″·15, thumb 0″·28, third finger 2″, fifth finger 1″·5, tibia 0″·5, foot 0″·25.

Hab. Sumatra, Java, Borneo.

34. Vesperugo abramus.

Vespertilio imbricatus, *Temm. (non Horsfield) Monogr. Mammal.* ii. p. 216, pl. 54; *Wagner, Suppl. Schreb. Säugeth.* v. p. 738 (1855).

Vespertilio abramus, *Temm. l. c.* p. 232, pl. 58; *Wagner, l. c.* p. 739.

Scotophilus javanicus, *Gray, Mag. Zool. & Bot.* ii. p. 498 (1838).

Scotophilus coromandra, *Gray, l. c.*

Vesperugo nathusii, *Keys. & Blas. Wiegm. Archiv*, 1839, p. 320; *Blasius, Fauna Deutschlands*, p. 58, figs. 37, 38 (1857).

Vespertilio coromandelicus, *Blyth, J. A. S. B.* p. 159 (1855).

Vesperugo blythii, *Wagner, op. cit.* p. 742 (1855).

Scotophilus coromandelicus, *Horsfield, A. & M. N. H.* 1855, p. 5.

Scotophilus pumiloides, *Tomes, P. Z. S.* 1857, p. 51.

Vespertilio coromandelicus, *Tomes, P. Z. S.* 1858, p. 539.

Pipistrellus coromandelicus, *Dobson, J. A. S. B.* 1871, p. 461.

Vesperugo imbricatus *et* micropus (*Hutton*), *Peters, P. Z. S.* 1872, pp. 707, 708.

Vesperugo abramus, *Dobson, Monogr. Asiat. Chiroptera*, p. 97 (1876).

Muzzle obtuse, more so than in *V. pipistrellus*, glandular prominences on the sides large, rounded, adding more to the width than to the depth of the muzzle, and causing a furrow between them and the crown of the head. Ears triangular, as in *V. pipistrellus*; but the outer margin is straight or very slightly concave, and the tragus is somewhat shorter, and its inner margin rather more concave.

Feet small; wing-membrane attached to the base of the toes; postcalcaneal lobe distinct, rounded; last rudimentary caudal vertebra free.

The head, and face between the eyes, are densely covered with moderately long fur, while the space in front of the ears, about the

eyes, and the extremity of the muzzle generally are almost naked. Laterally, the fur of the body covers only the proximal third of the humerus and half the femur, and its extent upon the wing-membrane is limited to a narrow portion along the sides of the body; beneath, the humerus and femur are similarly covered, but a wider portion of wing-membrane is occupied, the fur extending as far as a line drawn from the elbow to the knee-joint. The upper surface of the interfemoral is covered as far as the end of the third caudal vertebra; beneath, the fur of the abdomen covers the root of the tail only, the remaining portion is clothed with very short thinly spread hair.

Above, dark brown, the hair tipped with light yellowish brown, on the head, face, and neck wholly yellowish brown; beneath, soot-brown, the extremities of the hairs much paler than upon the upper surface.

Upper inner incisors long and bifid, the external cusp placed slightly posteriorly; the outer incisor on each side slightly exceeding the outer cusp of the inner incisor in length. Lower incisors not crowded. The second upper premolar separated by a slight interval from the canine, through which the summit of the small first premolar may be seen.

Length (of an adult ♀ preserved in alcohol), head and body 1″·8, tail 1″·5, head 0″·65, ear 0″·5, tragus 0″·23, forearm 1″·35, thumb 0″·25, third finger 2″·45, fifth finger 1″·75, tibia 0″·5, foot 0″·3.

Hab. Apparently generally distributed throughout the Oriental Region, extending from India through Burma and China to Southern Japan and the islands of the Malay Archipelago, also to the northern part of the Australian Region (Celebes, New Guinea, North Australia). Found during the summer months in the Palæarctic Region throughout Middle Europe (*Blasius*) from the Rhine to Southern Russia, and from Northern Germany to the Mediterranean, even extending into Sweden (*Nilsson*).

This species was long known as *Vesperugo imbricatus*; but the type of that species is (as I have satisfied myself by direct comparison of the type specimen in the Museum of the East India Company) an example of the same species described by Temminck under the name of *V. macrotis*, which consequently becomes a synonym of *V. imbricatus*. From Blasius's descriptions and figures of *V. nathusii*, I have no hesitation in referring it to this species, which evidently migrates northward during the summer months, as it has never been taken in Europe in winter.

V. abramus is probably the most common species of Bat in the Oriental Region, where it takes the place of our Pipistrelle (*V. pipistrellus*). From that species it is easily distinguished by the absence of the deep emargination in the upper half of the outer side of the ear, by the relative lengths of the upper incisors, by its somewhat larger size, and by the extraordinary length of the penis, which, in proportion to the size of the animal, is much greater than in any other species of Bat. This appears to be mainly due to the great development of the prepuce.

a, *b*. ♂ & ♀ ad., al.	China.	Rev. G. Vachell [P.].
c. ad. sk.	China.	John Gould, Esq. [C.].
(Type of *Vespertilio pumiloides*, Tomes.)		
d. ♂ ad. sk.	China.	John Gould, Esq. [C.].
e. ♂ ad., al.	Chefoo.	R. Swinhoe, Esq. [C.].
f, *g*. ♂ & ♀ ad., al.	Shanghai.	R. Swinhoe, Esq. [C.].
h, *i*. ♀ ad., al.	Camboja.	M. Mouhot [C.].
j. ♂ ad., al.	Hong Kong.	J. Bowring, Esq. [C.].
k. ♂ ad., al.	? China.	J. Bowring, Esq. [C.].
l. ♀ ad., al.	? China.	J. Bowring, Esq. [C.].
m, *n*. ♂ ad. sk.	Japan.	Purchased.
o. ad. sk.	Japan.	
p, *q*. ad. sks.	India.	E. I. Company [P.].
r. ad. sk.	? Calcutta (with MS. note from Blyth).	
s. ad. sk.	? India.	Capt. Tytler [P.].
t–*d'*. ♂ & ♀ im. et ad., al.	Nipal.	B. H. Hodgson, Esq. [P.].
(Labelled *Scotophilus fuliginosus*, Hodgson.)		
e', *f'*. ♀ ad., al.	Darjiling.	E. Blyth, Esq. [P.].
g'–*i'*. ♂ & ♀ ad., al.	Madras.	T. C. Jerdon, Esq. [P.].
j'. imm. sk.	Bombay.	Dr. Leith [P.].
k', *l'*. ♂ & ♀ juv. et ad., al.	Ceylon.	Purchased.
m'. ♀ ad., al.	Ceylon.	Purchased.
n'. ♂ imm., al.	Ceylon.	Purchased.
o'. ♀ imm., al.	Ceylon.	Purchased.
p'. ♂ imm., al.	Car-Nicobar Island.	G. E. Dobson, M.B. [P.].
q'–*s'*. ♂ & ♀ juv., al.	Ceylon.	Purchased.
t', *u'*. ♂ imm., al.	Singapore.	Dr. Meyer [C.].
v'. ad. sk.	? Java.	E. I. Company [P.].
w'. ad. sk.	? Java. (Labelled "Lowo-manir.").	
x'. ♂ ad., al.	Philippine Islands.	H. G. Veitch, Esq. [P.].
y'. ♂ ad., al.	North Celebes.	Dr. Meyer [C.].
(Var. differing slightly in the form and position of upper incisors.)		
z'. ad. sk.	Macassar.	
(Labelled *Scotophilus nitidus*, Tomes, ? type.)		
a'', *b''*. ♂ & ♀ ad., al.	New Guinea, south of Huon Gulf.	Dr. Comrie [C.].
c'', *d''*. ♂ & ♀ ad., al.	Australia.	Earl of Derby.
e''. ♂ ad., al.	Zanzibar.	
f''. ad. sk.		Purchased.
g''. imm. sk.		Zool. Soc. Coll.
h''. ♀ imm., al.		M. Lidth de Jeude.
i''. ad. sk.		Purchased.
j''. ♀ imm., al.		Old Collection.
k'', *l''*. ♀ ad., al.		Purchased.
m''. skeleton.	Formosa.	

VESPERUGO HESPERUS.

Scotophilus hesperus, *Allen, Monogr. Bats of North America*, p. 43, figs. 38, 39 (head and ear) (1864).

The following is Dr. Allen's description of this species, the type of which I have not seen, and of which no specimens, so far as I know, have been received in any of the European Museums:—

"Diminutive. Head small, flat; face blunt and stout, not hairy. Tragus short, blunt, slightly concave on inner, convex on outer border, causing it to incurve. Thumb small; nail dull and minute; foot very small; wing-membrane attached to base of toes. Interfemoral membrane ample. A small ex-calcaneal lobe of membrane, the termination of calcaneum blending with the membrane. The tip of the tail is not exserted. Body rather slender.

Var. *a*.

Vespertilio irretitus, *Cantor, Ann. & Mag. Nat. Hist.* ix. p. 481 (1842).
Vespertilio meyeni, *Waterhouse, P. Z. S.* 1845, p. 7; *Ann. & Mag. Nat. Hist.* xvi. p. 53.
Vesperugo irretitus, *Dobson, Monogr. Asiat. Chiropt.* p. 98 (1876).

Ear-conch as in typical specimens of *V. abramus*, but the tragus is more narrowed above, slightly smaller, and the lobule near the base of its outer margin is less distinct. The head is also distinctly broader, and more elevated above the face-line, and this breadth of the head causes the muzzle to appear triangular; the glandular prominences are well developed, but occupy chiefly the sides of the muzzle and the upper lip, which is considerably thickened, and do not cause a depression on the upper surface.

Thumb and feet considerably larger than in *V. abramus*; post-calcaneal lobe narrower and longer, commencing close to the feet.

Incisors as in typical specimens of *V. abramus*, but the first upper premolar is longer, and placed quite internal to the canine, so that, although the second premolar is separated from the canine by a small space, the first premolar can scarcely be seen from without.

Length, head and body 1″·55, tail 1″·2, head 0″·55, ear 0″·48, tragus 0″·22, forearm 1″·3, thumb 0″·3, third finger 2″, fifth finger 1″·5, tibia 0″·45, foot 0″·28.

Hab. Chusan, east coast of China; Philippine Islands.

a, *b*.	♂ & ♀ ad., al. (type).	Chusan.	Dr. Cantor [P.].
c–g.	♂ & ♀ ad., al.	Philippine Islands.	Zool. Soc. Coll.

(Types of *Vespertilio meyeni*, Waterhouse.)

"The fur is somewhat scanty; it is thickest on the back, where it is of an obscure dirty grey, blending in some individuals to a brownish colour, that in front being thinner and of a lighter hue. The main bulk of the fur is of a dark plumbeous, the above-mentioned colours constituting the tips only.

"*Upper Jaw.*—The incisors, both central and lateral, unicuspid and of equal length; the canines moderately developed; the first premolar is very small, wedged in between the canine and the second premolar, which is large, as in other species of *Scotophilus* (*Vesperugo*); the molars as usual.

"*Lower Jaw.*—The incisors and canines not peculiar; the premolars two in number; the first is small and is unicuspid, the second larger with an obscure basal cusp. The skull is eminently Scotophiloid, being flat and broad.

"Length, head and body 1″·35, tail 1″, forearm 1″·1, tibia 0″·45, third finger 1″·7, ear (posteriorly) 0″·3.

"This Bat resembles the *S. pipistrellus* of Europe in the contour of the head, the shape of the ear and tragus, the smallness and shape of the thumb and nail, the character of the interfemoral membrane, and in the style of colouring. The greater part of the fur in both is of dark plumbeous, the tip alone being of a hue at variance with it. These tips in *S. hesperus* are brownish grey and fawn, in *S. pipistrellus* being a rich olive-brown."

The above description agrees very well with a specimen of a Bat from the Straits of Juan da Fuca (Vancouver's Island), which is preserved in the collection of the Haslar Museum near Portsmouth, and which appears to me to be identical with *V. abramus*; but I hesitate to accord to the latter species so wide a distribution on the evidence of a single species, though it is highly probable that, as the Serotine is found also in America, this species, which has so wide a distribution in the eastern hemisphere, may also extend into the New World.

35. Vesperugo kuhlii.

Vespertilio kuhlii, *Natt. in Kuhl, Deutsch. Fledermm. Wetterau. Ann.* iv. p. 58 (1817); *Desmarest, Mammalogie*, p. 140 (1820); *Temm. Monogr. Mammal.* ii. p. 196 (1835–41).
Vespertilio marginatus, *Rüppell, Atlas, Voy. Egypt*, p. 74 (1826); *Temm. l. c.* p. 201, pl. 52.
Vespertilio albolimbatus, *Kuster, Isis*, 1835, p. 75.
Romicia calcarata, *Gray, Mag. Zool. & Bot.* ii. p. 495.
Vespertilio vispipistrellus, *Bonap. Faun. Ital.* fasc. xx.
Vesperugo kuhlii, *Blasius, Fauna Deutschl.* p. 63, figs. 41, 42 (1857); *Dobson, Monogr. Asiat. Chiropt.* p. 94, fig. *a* (1876).
Nycticejus canus, *Blyth, Cat. Mammal. Mus. As. Soc. Beng.* p. 32; *Jerdon, Mammals of India.*
Scotophilus lobatus, *Jerdon, Mamm. of India*, p. 35 (1867).
Vesperugo leucotis, *Dobson, J. A. S. B.* 1872, p. 212.

Ears larger than in *V. abramus*, triangular; base of the inner margin very convex forwards, tip of the ear obtusely rounded off, outer margin flatly emarginate above for more than one third its length, causing the tip to project slightly, the lower two thirds slightly convex, the edge reflected backwards, terminating at a short distance behind the angle of the mouth. Tragus larger than in *V. abramus*, attaining its greatest breadth slightly below the middle of the inner margin; the triangular lobule above the base of the outer margin is succeeded by a slight concavity, above which the outer margin reaches its greatest convexity; the inner margin is straight, and the tip is obtusely rounded off from without inwards.

Wings from the base of the toes; feet small; calcaneum very long; postcalcaneal lobe distinct, rounded; extreme tip of tail free. The posterior edge of the interfemoral and wing-membranes generally margined with white; membranes and ears dark.

On the upper surface the fur extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the knee-joint; posteriorly, about one third of the interfemoral membrane is covered. Beneath, the wing-membrane is thinly covered nearly as far as a line drawn from the elbow to the knee, and half the surface of the interfemoral is clothed with short fine hairs arising from the transverse dotted lines.

Above, black for three fourths the length of the fur, the terminal one fourth light yellowish brown or dun-colour; beneath, black for the same extent, the extremities ashy, becoming almost white on the abdomen and pubes. (This is the colour of the fur in specimens from Southern Europe.)

In specimens from the sandy regions of Baluchistan and Northern India (*V. leucotis*, Dobson), the ears, sides of face about the eyes, interfemoral membrane, antebrachial membrane, and the wing-membrane near the sides of the body are white, very translucent, and the remaining part of the wing-membrane is traversed by very distinct white reticulations. In them the glandular prominences on the sides of the muzzle are greatly developed in a vertical direction

so as to cause a considerable depression between them on the face.

Inner upper incisors long and acutely pointed; outer incisors very short, scarcely one fourth the length of the inner incisors; the first upper premolar very small, in the angle between the closely approximated second premolar and the canine; lower incisors trifid and slightly crowded.

Length (of an adult ♀ preserved in alcohol), head and body 1″·75, tail 1″·5, ear 0″·55, tragus 0″·25, forearm 1″·35, thumb 0″·25, third finger 2″·4, fifth finger 1″·7, tibia 0″·45, foot 0″·28.

Hab. Southern Europe—countries south of the Pyrenees and the Alps; Northern Africa; Southern Asia—Palestine, Persia, Baluchistan, India; probably generally distributed throughout these countries.

a. ♀ ad., al.	Silesia.	Dr. Günther.
b, *c*. ♂ & ♀ ad., al.	Silesia.	Dr. Günther.
d. ♂ ad., al.	Silesia.	Dr. Günther.
e. ♂ ad., al.	Sicily.	M. Parzudaki [C.].
f, *g*. ad. sks.	Algiers.	Purchased.
h, *i*. ♂ & ♀ ad., al.	Tunis.	Mr. Fraser [C.].
j, *k*.	Tripoli.	Purchased.
l–*n*. ♂ & ♀ ad., al.	Palestine.	Rev. H. B. Tristram [C.].
o, *p*. ♂ & ♀ ad., al.	Karwan, S.E. Persia.	W. T. Blanford, Esq. [C.].
q, *r*. ♂ & ♀ ad., al.	Madras.	T. C. Jerdon, Esq. [P.].
s. ♀ ad., al.	Madras.	Sir A. Smith [P.]
t. ad. sk.	India.	General Hardwicke [C.].
u. ♂ ad., al.	Lingasugur, S. India.	G. E. Dobson, M.B. [P.].
v. ♂ ad., al.	Affghanistan.	Dr. Horsfield [P.].
w. ♀ ad., al.	Senafi.	W. T. Blanford, Esq. [P.].
x. ♂ ad., al.		M. Parzudaki [C.].
y. ♀ ad., al.		Haslar Museum.
z. ♂ ad., al.	(Type of *Romicia calcarata*, Gray.)	
a'. ♂ ad., al.		M. Lidth de Jeude.
b', *c'*. ♂ imm. et ad., al.		Old Collection.
d'. skull.	India.	Sir Walter Elliot [P.].

36. Vesperugo maderensis.

Ears and tragus generally like those of *V. kuhlii*, but the outer margin of the ear-conch is much more deeply emarginate above, and the middle third consequently more abruptly convex (Plate XII. fig. 5, ear, double natural size).

Postcalcaneal lobe distinct, placed on the calcaneum about the length of the foot from the ankle; extremity of the tail free; wings from the base of the toes; feet small.

Fur, above, dark brown with light brown extremities to the hairs; beneath, the hairs are dull black with yellowish-brown tips. No trace of a white margin to the membranes.

On the upper surface the fur extends upon the wings almost as far as a line drawn from the proximal third of the humerus to the knee, and upon the base of the interfemoral membrane; beneath, the wing-membrane is clothed as far as a line drawn from the

elbow to the knee; fur longer on the ventral than on the dorsal surface.

Inner upper incisor on each side very slender, long, and unicuspidate, the outer incisor very small and close to its base; lower incisors at right angles to the direction of the jaw; second upper premolar separated by a narrow space from the canine, through which the summit of the minute first premolar can in some specimens be seen.

Length (of an adult ♂), head and body 1″·6, tail 1″·5, head 0″·55, ear 0″·5, tragus 0″·22, forearm 1″·3, thumb 0″·22, second finger 2″·25, fourth finger 1″·6, tibia 0″·45, foot 0″·25.

(Three specimens (from Palma and Madeira) have been examined and measured by me and found to agree in all respects.)

Hab. Madeira and Canary Isles.

This species is closely allied to *V. kuhlii*, but may be at once distinguished by the much shorter body and longer tail, by the very deep emargination on the outer side of the ear, and by the complete absence of the white margin to the membranes.

a.	♀ ad., al. (type).	Madeira.	W. S. MacGillivray [C.].
b.	♂ ad., al.	Palma.	

37. Vesperugo krefftii.

Noctulinia tasmanensis, *Gray, List of Mammal. Brit. Mus.* p. 194 (not described) (1843).

Vesperugo krefftii, *Peters, MB. Akad. Berl.* 1869, p. 404.

Ears shorter than the head, laid forwards their extremities do not reach halfway between the eyes and the end of the nose; ear-conch triangular, inner margin very convex in lower half, the tip rounded off and distinct, owing to a deep and abrupt emargination which occupies the upper third of the outer margin, middle third convex above, then straight, lower third terminating abruptly without forming a lobe; tragus narrow in upper third, acutely pointed and curved inwards, a distinct acutely triangular lobe at the base of the outer margin.

Wings from the base of the toes or from the metatarsus; the small cartilaginous extremity of the tail alone free; postcalcaneal lobe very shallow, as in the Serotine.

Face in front of the ears nearly naked, glandular prominences with a few long hairs; wing-membrane naked except along the sides of the body, under surface of the interfemoral with short fine hairs. Above, dark reddish brown, paler beneath; the base of the hairs on both surfaces very dark brown, almost black.

Upper outer incisor on each side extremely small, about equal to the cingulum of the inner incisor in vertical extent; inner incisors unicuspidate, long and strong; first upper premolar minute, in the inner angle between the canine and the closely approximated second premolar; lower incisors transverse, placed at right angles to the direction of the jaws; first lower premolar about one third the vertical extent of the second.

Length (of the type specimen, an adult ♀), head and body 2″·4, tail 2″, head 0″·85, ear 0″·75, tragus 0″·3, forearm 1″·9, thumb 0″·4, third finger 3″·35, fifth finger 2″·3, tibia 0″·8, foot 0″·4.

Hab. Australia (New South Wales); Tasmania.

a. ad. sk. Tasmania.
(Type of *Noctulinia tasmanensis*, Gray.)

38. Vesperugo pulcher.

Vesperugo pulcher, *Dobson, P. Z. S.* 1875, p. 471.

Crown of the head slightly elevated above the face-line; muzzle shaped more like that of some species of *Vespertilio* (*V. emarginatus*, e. g.), and the glandular prominences between the nostrils and eyes less developed than in most species of *Vesperugo*. Ears about four fifths the length of the head, the ascending inner margin straight or faintly convex, the upper half of the outer margin slightly concave, terminating in a line directly below the eye, but on a lower level than the angle of the mouth; tragus nearly half the length of the ear, shaped like that of *V. serotinus* (Plate XII. fig. 6).

Posterior margin of the interfemoral membrane festooned with distinct papillæ arranged like the teeth of a comb (Plate XII. fig. 6, *a*).

Fur above sienna-brown, with shining tips, beneath *wholly pure white*; the dark-coloured fur of the back does not pass beyond a line connecting the angle of the mouth (when the head is extended) and the under surface of the humerus. Interfemoral, antebrachial, and wing-membranes between the humerus and femur white; the remaining parts of the wing-membrane pale brown.

Inner upper incisor long, with a second cusp on its outer side near the extremity. Outer incisor short, lying close to the base of the inner incisor. Second premolar in the upper jaw separated from the canine by a short interval, through which the small first premolar is distinctly visible from without. Lower incisors not crowded.

Length (of an adult ♂ preserved in alcohol), head and body 2″, tail 1″·6, head 0″·7, ear 0″·6, tragus 0″·25, forearm 1″·35, thumb 0″·28, third finger 2″·6, fifth finger 1″·9, tibia 0″·52, foot 0″·3.

Hab. S.E. Africa (Zanzibar).

Type in the collection of the British Museum.

a. ♂ ad., al. (type). Zanzibar. Dr. Kirk [P.].

39. Vesperugo temminckii.

Vespertilio temminckii, *Cretzschmar, Rüppell, Atlas Reise nördl. Afrika, Zoolog.* p. 17, fol. 6 (1826).
Vespertilio rüppellii, *Fischer, Synop. Mammal.* p. 108.
Vesperugo rüppellii, *Wagner, Suppl. Schreb. Säugeth.* v. p. 745 (1855).
Vespertilio (Alobus) temminckii, *Peters, MB. Akad. Berl.* 1867, p. 707.

Considerably smaller than *V. pulcher*, and the muzzle compara-

tively broader and more obtuse in front; tragus also more expanded and rounded off above, and the upper half of its inner margin is distinctly concave.

Posterior margin of the interfemoral membrane with a few ill-defined papillæ.

Fur, above, dark brown with paler extremities; beneath, pale yellowish white. Membranes as in the preceding species.

Inner upper incisor long, with a second well-defined external cusp partially distinct from the cingulum downwards; outer incisor very small, not distinguishable with the naked eye, close to the outer and anterior side of the inner incisor; lower incisors placed at right angles to the direction of the jaws, slightly overlapping; first upper premolar very small, not visible from without.

Length (of an adult ♀ preserved in alcohol), head and body 1″·8, tail 1″·3, head 0″·6, ear 0″·53, tragus 0″·2, forearm 1″·15, thumb 0″·23, third finger 2″·15, fifth finger 1″·55, tibia 0″·4, foot 0″·23.

Hab. N.E. Africa (Egypt, Abyssinia, Nubia).

The above description has been taken from a well-preserved specimen in the collection of the Museum of the Army Medical Department at Netley, which I have compared with the type of the species.

40. Vesperugo annectens.

Pipistrellus annectens, *Dobson, Proc. Asiat. Soc. Beng.* 1871, p. 213.
Vesperugo annectens, *Dobson, Monogr. Asiat. Chiropt.* p. 116, figs. *a, b* (1876).

Head slightly elevated; face hairy; glandular prominences of the upper lip small; ears pointed, with rounded tips, outer margin deeply hollowed out immediately below the tip, then convex, again slightly concave opposite the base of the tragus, and terminating by forming a small rounded lobe; tragus long, subacutely pointed, inner margin almost straight, outer slightly convex, with a small rounded lobe at the base.

Extreme tip of tail free; no membranous lobe on posterior margin of calcaneum.

Fur, so far as can be ascertained from the inspection of a specimen in spirit, above dark brown with paler tips; beneath brown, reddish towards the tip.

The fur of the head extends upon every part of the face, except the nostrils, forming a thick fringe along the margin of the upper lip; the parts beneath the eyes and the glandular prominences are not so densely covered as the remaining portions.

On the wing-membrane the fur of the body extends, above and beneath, nearly as far as a line drawn between the middle of the humerus and the knee-joint; the remaining portions of membrane are quite naked. The interfemoral membrane is covered above at the root of the tail and beneath to a similar extent.

Upper incisors nearly equal; of the pair on each side the inner incisor is slightly notched at its extremity; canines small, scarcely

exceeding the second premolar in the upper jaw in vertical extent; in the lower jaw the second premolar slightly exceeds the canine; first upper premolar minute, placed slightly inside the tooth-row, but distinctly visible from without.

Length, head and body 2″, tail 1″·6, head 0″·75, ear 0″·6, tragus 0″·3 × 0″·07, forearm 1″·8, thumb 0″·3, third finger 3″, fifth finger 2″·1, tibia 0″·75, calcaneum 0″·7, foot 0″·3.

Hab. Naga Hills, Assam.

Type in the collection of the Indian Museum, Calcutta.

41. Vesperugo georgianus.

Vespertilio georgianus, *F. Cuv. Nouv. Ann. du Musée*, p. 16 (1832); *Wagner, Suppl. Schreber Säugeth.* i. p. 531, v. p. 750 (1855); *Leconte, Proc. Acad. Nat. Sci. Philad.* 1855, p. 436.

Scotophilus georgianus, *Allen, Monogr. Bats N. Amer.* p. 35 (1864).

Ears like those of *V. temminckii*, but narrower above, and the tragus resembles that of the preceding species, tapering towards the tip, which is subacutely pointed; at the base of the outer margin a triangular lobe is placed, succeeded by an emargination, immediately above which the tragus reaches its greatest width, thence it quickly lessens towards the subacute tip; the inner margin is straight, the outer convex opposite the base of the inner margin and straight in its upper third (Plate XII. fig. 7). The glandular prominences on the muzzle are moderately developed.

Thumb large; tibia long; feet very large, the toes more than half the length of the foot; no postcalcaneal lobe; last vertebra of tail quite free.

Above, dark brown at the base of the hairs, the terminal third of the hair light yellowish brown; beneath similar, but of a lighter shade.

The fur of the back extends upon the basal half of the interfemoral membrane, and long hairs clothe the leg as far as the ankle; beneath, the wing-membrane is covered as far as a line drawn from the elbow to the knee-joint; the base of the interfemoral membrane is clothed with long hair, and the rest of the surface with short hairs occurring more densely along the tail.

The upper incisors are more like those found in the genus *Vespertilio*; the inner incisor is directed inwards, and has a cusp on its posterior and outer surface; the outer incisor is directed vertically downwards, is unicuspidate, and about three fourths the length of the inner one. The incisors are thus directed differently, and are separated by a considerable interval at their extremities, as in *Vespertilio mystacinus*, *V. adversus*, and other species of that genus. The canine is separated by a rather wide interval from the second premolar, through which the small first premolar is distinctly visible from without, and is much larger than in either *V. pipistrellus* or *V. abramus*. The lower incisors are not crowded; the first lower premolar is less than half the size of the second premolar.

Length (of an adult ♀ preserved in spirits), head and body 1″·7, tail 1″·6, tail free from membrane 0″·15, head 0″·58, ear 0″·55, tragus 0″·23, forearm 1″·35, thumb 0″·35, third finger 2″·45, fifth finger 1″·8, tibia 0″·6, foot 0″·38.

Hab. North America.

a. ♀ not quite ad., al.		Zool. Soc. Collection.
b. ♀ ad., al.		Smithsonian Institute.
c. ♀ ad., al.		Smithsonian Institute.

42. Vesperugo tylopus.

Vesperugo (Glischropus) tylopus, *Dobson, P. Z. S.* 1875, p. 473; *Monogr. Asiat. Chiropt.* p. 114 (1876).

Muzzle broad and evenly rounded in front; nostrils opening on a level with the glandular prominences on each side, and without intervening emargination; glands of the upper lip greatly developed, forming smooth, almost naked prominences, causing a furrow along the centre of the face behind the nostrils. Ears triangular, narrowed above, with rounded tips, the ascending part of the inner margin very faintly convex, nearly straight; the upper third of the outer margin straight, succeeded by a considerable convexity, causing the upper third to appear concave, then distinctly angularly emarginate opposite the base of the tragus, and terminating in a well-defined lobe midway between the base of the tragus and the angle of the mouth, but on a lower level than the mouth. This angular emargination and round terminal lobe are even better-defined than in *V. nanus*. Tragus faintly concave along the inner margin, outer margin slightly convex, tip obtusely rounded off; a minute very acutely pointed projection slightly above the base of the outer margin (Plate XII. fig. 8, head, double natural size).

Thumb rather long; *the whole of the lower surface of the basal half occupied by a naked rounded callosity* of a pale yellow colour (in alcohol), with transverse wrinkles; the sole of the foot is similarly formed, but the surface is flat or slightly concave. The light yellow colour of the callosities or elastic and adhesive pads of the thumbs and feet contrasts remarkably with the very dark colour of the integument of the surrounding parts.

Postcalcaneal lobe distinct; extreme tip of tail projecting. Inner upper incisors long, bifid, the smaller cusp placed posteriorly and externally near the extremity; outer incisors very short, but in cross section equal to the inner ones, placed in a plane slightly anterior, the single cusp sloping inwards and lying against the cingulum of the inner incisors. Lower incisors trifid, not crowded. First upper premolar internal, but visible from without.

Length, head and body 1″·55, tail 1″·5, head 0″·55, ear 0″·5, tragus 0″·2, forearm 1″·2, thumb 0″·26, third finger 2″·4, fifth finger 1″·65, tibia 0″·55, foot 0″·26.

Hab. North Borneo.

a. ♀ ad., al. (type).	North Borneo.	Purchased.

43. Vesperugo nanus.

Vespertilio nanus, *Peters, Reise nach Mossambique*, p. 63 (1852).
Vesperugo nanus *et* pusillulus, *Peters, Jorn. Scien. Math.-Phys. Nat. Lisboa*, 1870, p. 124.
Vesperugo (Glischropus) nanus, *Dobson, P. Z. S.* 1875, p. 472.

Resembles *V. pipistrellus* in the general form of the muzzle and in size; but the ears are much narrower, and their outer margin distinctly angularly emarginate opposite the base of the tragus, terminating in a sharply defined, projecting square lobule; the inner margin is regularly slightly convex from the base to the tip, which is shortly rounded off; the upper half of the outer margin distinctly concave. Tragus without triangular lobule or projection at the base, narrowest opposite the base, broadest opposite the upper fifth of the inner margin, the outer margin sloping inwards above to join the inner margin, and form with it a narrow terminal projection curved slightly inwards (Plate XII. fig. 9, head, double natural size).

Base of the thumb swollen, rounded, the surface marked with deep wrinkles; the sole of the foot similarly swollen and wrinkled, but flat, or slightly concave as in *Tylonycteris pachypus*; toes short, about half the length of the whole foot. Postcalcaneal lobe distinct, rounded, placed on the calcaneum at a distance equal to about three fourths the length of the foot from the end of the tibia. Tail as long as the head and body, the extreme tip projecting. Above dark brown or black, with shining tips; beneath brown or black at the base, with ashy extremities.

Upper incisors nearly equal in length, inner incisors bifid at extremities, outer unicuspidate. Lower incisors distinctly trifid, and not crowded. Second upper premolar separated from the canine by a narrow interval, through which the small first is visible from without.

Length, head and body 1″·6, tail 1″·6, head 0″·55, ear 0″·45, tragus 0″·22, forearm 1″·2, thumb 0″·22, third finger 2″·25, fifth finger 1″·65, tibia 0″·5, foot 0″·22.

Hab. The Ethiopian Region. Apparently generally distributed throughout Africa south of the Sahara and Madagascar.

Previous to the publication of my description of *V. tylopus*, and additional notes on this species, the only Bat in which similar peculiarities in the structure of the sole of the foot and ball of the thumb had been noticed was *V.* (*Vesperus*) *pachypus* (*vide antea*, p. 208). The peculiar formation of these parts evidently enables these species to cling to the under surfaces of large leaves and fruits (see my paper "On peculiar Structures in the Feet of certain Species of Mammals &c.," P. Z. S. 1876, pp. 526–534, pl. lv.).

a, b. ♂ imm., al.	West Africa.	Mr. Argent's Collection.
c. ♂ ad., al.	Zanzibar.	Dr. Kirk [P.].
d. ♀ ad., al.	Mossambique.	Dr. Peters's Collection.
e. ad. sk.	? South Africa.	Sir A. Smith [P.].
f. ad., al.	East London, British Caffraria.	Lieut. Trevelyan [P.].

Inc. $\frac{2-2}{6}$, *pm.* $\frac{2-2}{3-3}$; *wings from the base of the toes; interfemoral membrane hairy above. Hab.* Nearctic Region. Subgen. LASIONYCTERIS.

44. Vesperugo noctivagans.

Vespertilio noctivagans, *Leconte, Cuv. An. Kingdom, ed. M'Murtrie*, vol. i. App. p. 431, June 1831; *Cooper, Annals Lyc. New York*, 1837, p. 59; *Wagner, Suppl. Schreb. Säugeth.* v. p. 754 (1855).
Vespertilio auduboni, *Harlan, Amer. Month. Journ.* Nov. 1831, p. 220.
Vespertilio pulverulentus, *Temm. Monogr. Mamm.* ii. p. 235 (1840).
Scotophilus noctivagans, *Allen, Bats of N. America*, p. 39 (1864).
Lasionycteris noctivagans, *Peters, MB. Akad. Berl.* 1865, p. 648.

The extremity of the muzzle as far back as the angle of the mouth is nearly naked; glandular prominences large, causing the muzzle to appear very broad; nostrils separated by a rather wide interval, which is slightly concave. Ears nearly as broad as long, broadly rounded off above, with a straight outer margin reflected backwards as in *V. noctula*, and terminating close to the angle of the mouth; the basal lobe of the inner margin has a small rounded projection at its commencement behind, which projects backwards and appears to lie normally against the anterior and outer flat surface of the tragus, the inner margin of which lies in the angle between this projection and the ear-conch. The tragus is broad, and reaches its greatest width opposite the middle of the inner margin; the inner margin is straight, the outer has a small lobe at the base, succeeded above by a concavity, above which the outer margin becomes very convex (Plate XII. fig. 10, ear, slightly enlarged).

Wings from the base of the toes; feet rather small; termination of calcaneum indistinct, no postcalcaneal lobe; tip of tail projecting.

Fur, above, dark brown at the base, becoming very gradually lighter towards the extremities of the hairs, the terminal one fourth of which is silvery white, more conspicuous on the back; the head is brown throughout. Beneath, the fur of the neck is similar to that of the head, and that of the abdomen to the back. The membranes are almost black, the integument of the body and ears dark brown; the inner basal lobe of the ear is white, and this appears to be a constant character in this species.

On the upper surface the fur of the body extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the ankle-joint; the interfemoral membrane is covered for four fifths its extent, a triangular terminal portion behind, containing the last three vertebræ of the tail, being alone naked; beneath, the fur does not extend so far upon the membranes; the wing-membrane is covered thinly as far as a line joining the middle of the humerus and the knee-joint, and the interfemoral has a few minute hairs only on the part contained between the posterior limbs.

The upper incisors are similar to those of *V. pipistrellus*; the inner ones with a second smaller cusp placed posteriorly and exter-

nally, about one third shorter than the principal cusp; the outer incisor unicuspidate and equal in length to the outer cusp of the inner incisor. Lower incisors very distinctly trifid, placed rather across the direction of the jaws, but not crowded. The first upper premolar minute and placed internally, but may be seen from without, broad at the base and shortly conical; the second premolar longer than the succeeding molar; last molar two thirds the size of antepenultimate molar. First lower premolar small, but the second is scarcely half its size and slightly internal to it; the third premolar exceeds the succeeding molar in vertical extent.

Length (of an adult ♂, in spirits), head and body 2″·25, tail 1″·7, head 0″·75, ear 0″·65, tragus 0″·28 × 0″·12, forearm 1″·65, thumb 0″·22, third finger 2″·8, fifth finger 1″·95, tibia 0″·7, foot 0″·3.

This species is at once distinguished by the hairiness of the interfemoral membrane, and by the additional premolar in the lower jaw. These differences, though very characteristic of the species, are not sufficient to warrant its separation from *Vesperugo*, with the species of which it otherwise presents in the aggregate of its natural characters close generic affinities. It may, however, be regarded as the type of a subgenus, *Lasionycteris*, Ptrs.

Hab. North America, from Hudson's Bay (James Bay) to California, probably generally distributed between the 55th and 30th parallels N. latitude. (See list of localities given by Allen, *l. c.* p. 142.)

This species has probably the highest northern range among the Bats of America.

a. ad. sk.	Malden, Canada.	Dr. P. W. Maclagan [P.].
b. ad. ♀, al.		Smithsonian Institute [P.].
c. ad. sk.	No history.	

Inc. $\frac{2-2}{6}$, *pm.* $\frac{1-1}{2-2}$; *outer upper incisors very small, scarcely raised above the gum, generally posterior to the tooth-row; penis with a distinct bone; postcalcaneal lobe well developed; wings from the base of the toes.* *Hab.* Oriental Region. Subgen. HESPEROPTENUS, Ptrs.

Synopsis of the Species.

a. Outer upper incisors in the tooth-row.
  a'. Base of the thumbs simple, without adhesive cushions; forearm 1″·4, tibia 0″·7.. 45. *V. doriæ*, p. 239.
b. Outer upper incisors quite posterior to the tooth-row.
  b'. Base of the thumbs simple, without adhesive cushions; forearm 2″·2, tibia 0″·9 .. 46. *V. tickelli*, p. 240.
  c'. Base of the thumbs with broad adhesive cushions; forearm 1″·1, tibia 0″·45 .... 47. *V. blanfordi*, p. 242.

45. Vesperugo doriæ.

Vesperus (Hesperoptenus) doriæ, *Peters, MB. Akad. Berl.* 1868, p. 626.

Vesperugo (Vesperus) doriæ, *Dobson, Monogr. Asiat. Chiropt.* p. 112 (1876).

Ears quadrilateral, rounded, not emarginate, the outer margin terminating in a distinct lobe near the angle of the mouth; tragus rounded at the tip and curved inwards, reaching its greatest width immediately below the middle of the inner margin. A small lobule at the base of the outer margin. Metacarpal bones of the fingers nearly equal in length.

Wing-membrane from the base of the toes; tail wholly included within the interfemoral membrane; postcalcaneal lobe distinct.

Penis with a small but distinct bone.

Fur light brown, somewhat darker at the base of the hairs.

Inner upper incisors long and unicuspidate; the outer incisor on each side very small, scarcely rising above the surface of the gum. Lower incisors crowded.

Length (of an adult ♂), head and body 2″, tail 1″·6, head 0″·6, ear 0″·6 × 0″·48, tragus 0″·26, forearm 1″·4, thumb 0″·28, third finger 3″, fifth finger 1″·9, tibia 0″·7, calcaneum 0″·6, foot 0″·25.

Hab. Borneo (Sarawak).

This species was made the type of a new subgenus, *Hesperoptenus*, by Dr. Peters, on account of the extremely small size of the inner upper incisors, the presence of a distinct bone in the penis, and other characters, in which it differs from all the preceding species of the subgenus *Vesperus*. I have not seen the type specimen; but I think it is closely allied to *V. tickelli* and to *V. blanfordi*, which also have a distinct bone in the penis, and in which also the external upper incisor on each side is not only small, but is placed posterior to the canine and inner incisor.

Type in the collection of the Marquis Doria.

46. Vesperugo tickelli.

Nycticejus tickelli, *Blyth, Journ. Asiat. Soc. Beng.* xx. p. 157.
Nycticejus isabellinus, *Horsfield, Catal. Mammal. Mus. E. Ind. Company* (1851).
Vesperugo tickelli, *Dobson, Monogr. Asiat. Chiropt.* p. 113, figs. *a*, *b* (1876).

Head broad and flat; muzzle obtuse; glands of upper lip well developed; nostrils without intervening emargination, scarcely raised beyond the level of lip; lower lip with a simple naked space in front; ears moderate, rounded above, outer side straight or very slightly convex, emarginate opposite the base of the tragus, and terminating in a small rounded lobe, in front of which, and between it and the angle of the mouth, a small wart is placed; tragus lunate, outer margin very convex, inner slightly concave, rising from a narrow base, with the usual small rounded lobe at the outer side (Plate XII. fig. 3, ear, enlarged).

Tail long, last vertebra free; postcalcaneal lobe distinct; feet short.

The fur of the head extends forwards upon the face to a greater distance and in greater amount than in other species of this genus. The face is covered rather densely with fur as far as the commencement of the nostrils; a narrow space above the eyes, the sides of the face in front of the ears, and the glandular prominences of the upper lip are thinly clothed with short thinly spread hairs. The posterior and inner surface of the ear is densely covered with short fur. Laterally, the fur of the body extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the knee-joint, and thence backwards to the ankles along the outer side of the tibia; posteriorly the upper surface of the interfemoral membrane is densely covered at the root of the tail, and the fur extends backwards as far as a line drawn between the ankle-joints, becoming shorter and more thinly spread; the tibia is clothed with short dense fur, which also clothes the back of the foot, extending to the base of the claws. Beneath, the fur of the body extends thickly upon the wing-membrane as far as a line drawn from the elbow-to the knee-joint, and also posterior to the forearm, in a band nearly half an inch wide, to the carpus. The interfemoral membrane is thickly covered at its base, the fur quickly thinning out backwards into a few very short hairs occupying almost half its surface.

Fur pale straw-brown above, the bases of the hairs pale brown or buff; beneath pale buff.

The penis is very peculiarly shaped. As in *V. doriæ*, it has a distinct bone, and also a large saccular prepuce with a horizontal horseshoe-shaped opening.

Viewed anteriorly the upper incisors appear to be two in number only, and resemble those in the genus *Scotophilus* (p. 256), being unicuspidate and placed near the canines. In the angle behind the inner incisor and canine on each side the short outer incisor is placed, the summit of which is but slightly raised above the gum, and, seen through the small interval between the bases of the inner incisor and canine, appears as if it were a posterior basal cusp of the inner incisor. Lower incisors placed across the direction of the jaws, but not much crowded.

Length (of an adult ♂ preserved in alcohol), head and body 2″·65, tail 2″, ear 0″·75, tragus 0″·35 × 0″·15, forearm 2″·2, thumb 0″·42, third finger 4″·2, fifth finger 2″·9, tibia 0″·9, foot 0″·45, calcaneum 0″·9.

Hab. Peninsula of India (Chaibasa, Jashpur, Sirguja); Ceylon.

Type in the collection of the Indian Museum, Calcutta.

a, b. ad. sks.	Nusserabad, India.	E. I. House Collection.
c, d. ♂ & ♀ ad., al.	Ceylon.	Purchased.
e. ♂ ad., al.	Ceylon.	Dr. Thwaites [P.].
f. ad. sk.		
g. ad. sk.	Bombay.	Dr. Leith [P.].
h. skeleton.	India.	Dr. Leith [P.].

47. Vesperugo blanfordi.

Vesperugo (Hesperoptenus) blanfordi, *Dobson, Journ. Asiat. Soc. Bengal*, 1877, p. 312.

Head very flat and broad; muzzle obtusely conical; nostrils opening widely apart by semilunate apertures, the margins of which are level with the extremity of the muzzle; ears short, triangular in outline, with broadly rounded-off tips; upper half of the outer margin of the ear-conch straight, then convex, slightly concave opposite the base of the tragus, terminating abruptly in a deep lobe closer to the angle of the mouth than to the base of the tragus; tragus narrowest opposite the base of its inner margin, expanded above and curved inwards. Thumb short, with a very acute claw; *a broad adhesive cushion occupies the base of the inferior surface of the metacarpal bone*, and extends outwards and backwards upon the base of the metacarpal of the second finger.

Feet very small, the sole of the foot apparently adhesive, but not expanded as in *V. pachypus*; postcalcaneal lobe remarkably large (probably proportionately larger than in any other species of Bat) and broader than the foot, with a central cartilaginous prop; the extreme tip of the tail alone projecting.

Fur dark reddish brown above, slightly paler beneath.

Penis with a distinct bone, in shape quite similar to that of *V. tickelli*, and with a similar prepuce.

Dentition almost quite similar to that of *V. tickelli*, the outer upper incisors are even smaller and placed more behind the inner incisors; the inner incisors unicuspidate and very acutely pointed; lower incisors trifid and placed in the direction of the jaws; the single upper premolar close to the canine; the first lower premolar with a very short and obtuse cusp, the second equals three fourths the canine in vertical extent.

Length, head and body 1″·75, tail 1″·1, head 0″·6, ear 0″·45, tragus 0″·18, forearm 1″·1, thumb 0″·15; third finger—metacarp. 1″, 1st ph. 0″·6, 2nd ph. 0″·6; fourth finger—metacarp. 1″, 1st ph. 0″·53, 2nd ph. 0″·28; fifth finger—metacarp. 0″·95, 1st ph. 0″·35, 2nd ph. 0″·22; tibia 0″·45, foot 0″·25.

Hab. Tenasserim.

This species is about the size of *Vesperugo minutus*, Temm., from South Africa, and is therefore one of the smallest species of the genus. It is not half the size of *V. tickelli*, with which it agrees in other respects so closely. Its resemblance to that species in the position of the upper outer incisors and in the form of the penis, which has a distinct bone, is very remarkable. The single type specimen (an adult male in excellent preservation) was sent to me by Mr. W. T. Blanford, F.R.S., and is now in the collection of the Indian Museum, Calcutta.

The next subgenus approaches *Scotophilus* in the single pair of unicuspidate upper incisors placed close to the canines, but in all other characters agrees with *Vesperugo*. The first lower premolar is not crushed in between the adjoining teeth, as in the species of *Scotophilus*, but is slightly inclined outwards in the manner so characteristic of *Vesperugo*.

Inc. $\frac{1-1}{6}$, *pm.* $\frac{2-2}{2-2}$; *the single upper incisor, on each side, close to the canine, as in* Scotophilus; *premolars and molars as in the Subgenus* Vesperugo; *first minute upper premolar deciduous; the two central lower incisors larger than the other incisors; postcalcaneal lobe distinct. Hab.* Ethiopian and Oriental Regions. Subgenus SCOTOZOUS.

48. Vesperugo dormeri.

Scotozous dormeri, *Dobson, P. Z. S.* 1875, p. 373.
Vesperugo dormeri, *Dobson, Monogr. Asiat. Chiropt.* p. 118 (1876).

Crown of the head scarcely raised above the face-line, glands between the nostrils and eyes well developed, but not causing a depression between them on the muzzle; nostrils opening sublaterally, the space between divided in the centre by a narrow vertical ridge passing downwards to the lip as in *Vesperugo pipistrellus*: ears shorter than the head, triangular, with rounded tips; upper third of the outer margin of the ear faintly concave, then gradually convex, again slightly concave opposite the base of the tragus, and terminating in a rounded lobe below the eye, on a level with the angle of the mouth. Tragus with a small triangular lobe near the base of the outer margin; outer and inner margins parallel as far as the upper third of the outer margin, where the outer margin slopes suddenly upwards and inwards, meeting the inner margin at an angle.

Thumb armed with a strongly curved claw; postcalcaneal lobe distinct, triangular; tip of tail projecting; wings from the base of the toes; foot rather large, first toe nearly equal to the others in length.

Fur above brown, the extreme tips ashy; beneath darker brown, the terminal third of the hairs white.

A single large and acutely pointed unicuspidate incisor on each side above, directed forwards and inwards; this tooth almost touches the canine by its base; but its summit is closer to its fellow of the opposite side, owing to its direction inwards; from the outer side of its cingulum a very small spur projects. Second upper premolar large, equal to three fourths the canine in vertical extent, and placed close to it; in the small triangular space inside, between it and the canine, a minute premolar may be seen with the aid of a lens, not visible from without. Posterior upper molar equal to half the antepenultimate molar. Lower incisors crowded; middle incisors slightly larger than the others, all distinctly trifid; lower canines without a cusp from inner margin of cingulum. First lower premolar shorter than the second premolar, but in transverse

diameter rather greater, nearer by its summit to the second premolar than to the canine.

Length, head and body 1″·5, tail 1″·15, head 0″·6, ear 0″·45, tragus 0″·18, forearm 1″·25, thumb 0′·25, third finger 1″·85, fifth finger 1″·4, tibia 0″·4, foot 0″·28.

The above are the measurements of the type, an immature specimen; two skins in the collection from Berar appear to be examples of full-grown individuals, and afford the following measurements:—forearm 1″·4, third finger 2″·7, fifth finger 1″·85, tibia 0″·45, foot 0″·3.

Hab. Southern India (Bellary Hills).

a. imm., al. (type).	Bellary Hills, Madras.	Hon. J. Dormer [P.].
b, c. ad. sks.	Chanda, S.E. Berar.	W. T. Blanford, Esq. [P.].

49. Vesperugo schliefenii.

Nycticejus schliefenii, *Peters, MB. Akad. Berlin*, 1859, p. 224.
Vesperugo schliefenii, *Dobson, Monogr. Asiat. Chiropt.* p. 118 (1876).

Head as in *V. dormeri*. Ears broadly rounded off above; base of the inner margin of the ear-conch rounded, ascending portion slightly convex, becoming more convex in upper third; outer margin straight in upper half, thickened in lower half, and reflected outwards and backwards as far as a point opposite the base of the tragus, where an emargination occurs, succeeded by a convexity forming a terminal long lobule separated by a wart from the angle of the mouth. Tragus short, broad, curved forwards and inwards, reaching its greatest width above the middle of the inner margin, at the base of the outer margin a distinct triangular lobule.

Thumb moderate, with a small claw. Wings from the base of the toes; postcalcaneal lobe large and rounded; extremity of the tail projecting slightly.

Fur short; above, chestnut or light reddish brown; beneath, dirty buff. Face nearly naked; wings naked except at their origin from the sides of the body; a few hairs only appear on the inferior surface of the interfemoral membrane along the basal third of the tail.

Upper incisors much shorter than in *V. dormeri*, each with an external basal cusp; lower incisors in the direction of the jaws.

In one specimen (in the Paris Museum) I found the first upper premolar present on one side only; in another, both premolars were present.

Length (of an adult ♀), head and body 1″·9, tail 1″·4, head 0″·65, ear 0″·5, tragus 0″·18, forearm 1″·35, thumb 0″·23, third finger 2″·4, fifth finger 1″·7, tibia 0″·45, foot 0″·3.

Hab. Africa (Egypt; Abyssinia; W. Africa).

Type in the collection of the Berlin Museum.

a. ♂ imm., al. (? var.*).	West Africa.	Purchased.

* Without first upper premolars, and with the lower incisors at right angles to the direction of the jaws.

Inc. $\frac{1-1}{6}$, *pm.* $\frac{1-1}{2-2}$; *the single upper incisor, on each side, close to the canine; outer lower incisors cylindrical, much narrower than the inner and middle pair; first lower premolar well developed; postcalcaneal lobe distinct. Hab.* Central America. Subgenus RHOGEËSSA*.

50. Vesperugo parvulus.

Rhogeëssa parvula *et* tumida, *Allen, Proc. Acad. Nat. Sci. Philad.* 1866, pp. 285–6.

Head very slightly raised above the face-line; nasal apertures circular, directed forwards and slightly downwards; ears nearly as long as the head, much longer than broad; ear-conch narrowed in upper third and rounded off above, the lower four fifths of the inner margin is slightly but regularly convex, the upper fifth straight, the upper third of the outer margin hollowed out beneath the shortly rounded tip, the lower two thirds regularly convex to the termination about midway between the tragus and the angle of the mouth; tragus rather long and subacutely pointed; at the base of the outer margin a distinct rounded small lobe succeeded by an emargination, above which the tragus opposite the base of its inner margin suddenly attains its greatest width, the outer margin sloping thence upwards and inwards to the subacute tip.

Feet small, wings to the base of the toes; postcalcaneal lobe shallow; tip of the tail free.

Fur, above, pale yellow, with chestnut-brown extremities; beneath paler. On both surfaces the fur of the body extends outwards to about the same extent upon the wing-membrane, as far as a line drawn from the middle of the humerus to the distal third of the femur; the upper surface of the interfemoral membrane is nearly naked, beneath it has a few very fine and short hairs; the feet are naked; the inner side of the concave surface of the ear-conch along the inner margin is clothed with a few hairs; on the face the space in front of the ears, about the eyes, and the labial glands are nearly naked or clothed with a few long straight hairs only.

Upper incisors close to the canines, long and slender, the summit slightly notched, the notch disappearing as the tooth becomes worn down; lower incisors in the direction of the jaws; central and middle incisors bifid or trifid; outer incisors much narrower, almost cylindrical, obtuse; posterior upper molar half the size of the antepenultimate molar; first lower premolar three fourths the second in vertical extent, but nearly equal to it in cross section at the base, separated above by a considerable space from the canine owing to the backward projecting cingulum of the latter tooth.

Length (of an adult ♀, with *fœtus in utero*), head and body 1″·6, tail 1″·4, head 0″·55, ear 0″·53, tragus 0″·28, forearm 1″·15, thumb 0″·2, third finger 2″·1, fifth finger 1″·55, tibia 0″·46, foot 0″·25.

* *Rhogeëssa*, Allen (Proc. Acad. Nat. Sci. Philad. 1866, p. 285). In constituting this (?)genus, Mr. Allen remarks that the typical species is allied to the Noctilionidæ (= *Emballonuridæ*). I am quite unable to perceive any characters which ally it to any of the species of that family.

Hab. Mexico (Tres Marias, Mirador); Honduras; Costa Rica.

Although this species has the dental formula of *Nycticejus*, it, in all other respects, evidently belongs to the genus *Vesperugo*. This is especially shown by the notched upper incisors, the form of the ears and tragus, and the distinct postcalcaneal lobe.

I have no doubt that *Rhogeëssa parvula* and *R. tumida*, Allen, are the same species. The describer mentions no distinguishing character of sufficient importance. *R. tumida* was evidently described from a more fully-grown specimen than those from which the original description of *R. parvula* was taken.

This species must not be confounded with *Vespertilio parvulus*, Temminck, which is a true *Vespertilio*, and, in my opinion, identical with *Vespertilio nigricans*, Wied (see p. 319).

a, *b*.	♀ ad., al.	Honduras.	Mr. Dyson [C.].
c, *d*.	♀ ad., al.	Costa Rica.	Purchased.

7. CHALINOLOBUS.

Chalinolobus, *Peters, MB. Akad. Berl.* 1866, p. 679, and 1867, p. 480 (note); *Dobson, P. Z. S.* 1875, p. 382.

Muzzle broad, generally very short and obtuse; nostrils opening sublaterally, forming a prominent flattened central ridge on the upper surface of the muzzle, separated from the well-developed glandular prominences by a distinct groove on either side. Ears short and broad, rhomboidal or ovoid; the outer margin prolonged forwards towards the angle of the mouth; tragus expanded above and curved inwards. *Lower lip with a distinct fleshy lobule* placed near the angle of the mouth and projecting horizontally outwards. Wings to the base of the toes; tail generally nearly as long as the head and body.

Dentition. Inc. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$ or $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

Upper incisors unequal; the inner incisors on each side long and unicuspidate; outer incisors short, scarcely equalling in vertical extent the cingulum of the inner incisors; in species having two upper premolars the first is very small, placed in the inner angle between the canine and closely approximated second premolar, and visible only with the aid of a lens.

This genus closely resembles *Vesperugo* in general characters, but is readily distinguished by the lobe projecting from the lower lip on either side near the angle of the mouth, by the unicuspidate upper inner incisors, by the remarkable obtuseness of the muzzle and shortness of the head, by the prominent nostrils separated by distinct grooves from the well-defined glandular elevations, by the much longer and more slender tibiæ, and, in most species, by the peculiarly thin membranes traversed by remarkably distinct reticulations and parallel lines.

The form of the ear-conch and tragus, the short broad muzzle, the long tail generally wholly contained within the wing-membrane,

and the shortness of the first phalanx of the longest finger, in some species, connect it with *Miniopterus*.

Range. Australian and Ethiopian Regions.

Chalinolobus may be considered intermediate between *Vesperugo* and *Miniopterus*, though it is evidently more closely allied to the former, and may be similarly divided into subgenera. These subgenera, however, similarly artificially based upon the presence or absence of the minute first upper premolar, separate the species into two very natural groups distinguished by other more important characters and inhabiting respectively a great continent.

Synopsis of Subgenera and Species.

I. Premolars $\frac{2-2}{2-2}$, first upper premolar minute. CHALINOLOBUS.
Hab. Australia, Tasmania, and New Zealand.

a. Internal basal lobe of the ear not forming a distinct lobule at the base projecting backwards.
a'. With a transverse cutaneous process on the face between the eyes; forearm 1″·4 ..... 2. *Ch. signifer*, p. 250.
b'. No cutaneous process on the face; forearm 1″·55 ..... 1. *Ch. tuberculatus*, p. 248.

b. Internal basal lobe of the ear forming a distinct lobule at the base, projecting backwards.
c'. Outer margin of the ear terminating in front in a pendent lobule; forearm 1″·8 in adults ..... 3. *Ch. gouldii*, p. 250.
d'. Outer margin of the ear terminating in a horizontal lobule; forearm 1″·35 in adults ..... 4. *Ch. nigrogriseus*, p. 251.

II. Premolars $\frac{1-1}{2-2}$; the single upper premolar large, close to the canine ..... GLAUCONYCTERIS *.
Hab. Southern and Equatorial Africa.

a. Wing-membranes brown, unicoloured.
a'. Internal basal lobe of the ear commencing in a short obtuse lobule; lower incisors in the direction of the jaw; forearm 1″·65..... 7. *Ch. poensis*, p. 255.

b. Wing-membranes dusky white, traversed by well-defined reticulations.
b'. Internal basal lobe of the ear commencing in a long narrow lobule projecting backwards; lower incisors in the direction of the jaw; forearm 1″·7 ..... 5. *Ch. argentatus*, p. 252.
c'. Internal basal lobe of the ear commencing in a short obtuse lobule; lower incisors at right angles to the direction of the jaw; forearm 1″·55. 6. *Ch. variegatus*, p. 254.

* *Glauconycteris*, Dobson; P. Z. S. 1875, p. 333.

In the species included under the first section (subgenus *Chalinolobus*) the tragus reaches its greatest width above the middle of the inner margin, as in *Vesperugo noctula*; and there is either no lobule near the base of the outer margin, or its position is occupied by a slight convexity. In the species included under the second section (subgenus *Glauconycteris*) there is a distinct, acutely pointed, triangular lobule near the base of the outer margin of the tragus, which reaches its greatest width about the middle of the inner margin. In *Chalinolobus* the fur is generally dark (black or dark brown) and the head and shoulders are darker than the rest of the body; while in *Glauconycteris* the surface of the fur is generally light grey or cream-colour, and the head and shoulders are lighter than the parts behind. In *Glauconycteris* also the skull is shorter, and the brain-case has much thinner, almost transparent walls, and is much more elevated above the face-line (see skull of *Ch. poensis*, Pl. XIV. fig. 6). In all the species of the genus *Chalinolobus* the auditory bullæ are remarkably large, although the external ears are proportionately smaller than in any other genus of Vespertilionidæ (Plate XIV. fig. 6*a*, base of skull of *Ch. poensis*, double natural size).

Premolars $\frac{2-2}{2-2}$. Subgenus CHALINOLOBUS.

1. Chalinolobus tuberculatus.

Vespertilio tuberculatus, *Forster, Descript. Animal. in itinere ad Maris Australis Terras per annos* 1772–74, *&c.*, p. 62 (1844), *ed. Lichtenstein.*

Scotophilus morio (in part), *Gray, App. Grey's Narrat. Two Exped.* p. 405 (1841).

Scotophilus tuberculatus, *Tomes, P. Z. S.* 1857, p. 135, pl. liii. (bad); *Hutton, Trans. New-Zealand Institute*, iv. p. 185 (1871).

? Scotophilus microdon, *Tomes, P. Z. S.* 1859, p. 68.

Chalinolobus tuberculatus, *Peters, MB. Akad. Berl.* 1866, p. 679, and 1867, p. 480 (note); *Dobson, P. Z. S.* 1875, p. 383.

Head scarcely raised above the face-line; ears small, scarcely higher than the fur of the head, rounded off above; the concavity of the ear-conch marked with four or five distinct horizontal plicæ; the inner margin commencing without forming a lobule; the upper third of the outer margin flattened, the middle third convex, then emarginate opposite the base of the tragus, and terminating in a prominent lobule, which is separated from the angle of the mouth by a wart; tragus narrow opposite the base of its inner margin, expanded above, reaching its greatest width about the middle of the concave inner margin, at the base of the outer margin a small indistinct convexity (Plate XIV. fig. 1). Nostrils opening sublaterally and slightly downwards, the margins of the nasal apertures sharply cut and projecting above, separated by a rather wide concave space having a small ridge in the centre; the conjoined nasal tubes forming a prominent flattened ridge on the muzzle above, which is separated by a very distinct groove on each side from the

well-defined glandular eminences. Lower lip with a rounded horizontal lobule on each side near the angle of the mouth (Plate XIV. fig. 1 *a*).

Wings from the base of the toes; postcalcaneal lobe well developed, circular, prominent, supported internally, on the side next the tail, by a cartilaginous prop, the curved extremity of which forms its posterior margin; tail wholly contained within the interfemoral membrane.

Fur dark brown, almost black, on the head and anterior half of the back, passing into dark chestnut-brown posteriorly; beneath similar, but slightly paler; the colour of the hairs on both surfaces the same from the base to the tip. On the body the fur is rather long and dense. The face is covered with a few hairs only in front of the eyes; the wing-membrane on the upper surface is clothed as far as a line drawn from the middle of the humerus almost as far outwards as the knee-joint, beneath as far as a line drawn from the elbow to the knee, and a few hairs appear along the oblique lines behind the forearm; the base of the interfemoral between the thighs is alone covered.

Inner upper incisors long, with a short cusp near their extremities; outer incisors very short and unicuspidate, scarcely exceeding the cingulum of the inner incisors in length; lower incisors trifid, in the direction of the jaw; first upper premolar minute, concealed in the inner angle between the canine and the closely approximated second premolar, and not visible from without.

Length (of an adult ♀), head and body 1″·8, tail 1″·7, head 0″·58, ear 0″·45, tragus 0″·16, forearm 1″·55, thumb 0″·25, third finger 2″·7, fifth finger 1″·9, tibia 0″·7, foot 0″·3.

Hab. S.E. Australia; New Zealand.

In the long description of this species by Mr. R. F. Tomes, occupying three pages of the 'Proceedings of the Zoological Society,' taken from specimens "in spirit and in skin" (as the describer remarks), no notice is taken of the most important characters, such as the lobes of the upper lip and the very large postcalcaneal lobe, and in the coloured plate accompanying the description these parts are not shown. The form of the tragus is also wrongly described, and the dental formula is incorrectly stated. No better proof could be afforded that mere length of description is not sufficient to characterize a species.

a. ♀ ad., al.	New Zealand.	
b, *c*. ad. sk.	New Zealand.	
d. ad. sk., in al.	New Zealand.	Wellington Museum [E.].
e. ad. sk.	Tasmania.	
f. ad. sk., in al.	South Australia. (Type of *Scotophilus morio*, Gray.)	
g. ad. sk.	Sydney.	
h. ♀ imm., al.	Peak Downs, Queensland.	Purchased.
i. ad. sk.	(Figured and described in 'Voy. Erebus and Terror.')	

2. Chalinolobus signifer.

Chalinolobus signifer, *Dobson, Ann. & Mag. Nat. Hist.* 1876, xvii. p. 289.

Ears and nostrils as in *Ch. tuberculatus*; but behind the nostrils on the face, between and slightly in front of the eyes, an erect transverse process (like the transverse nose-leaf in *Phyllorhina*, but smaller and not concave in front) is placed. This process commences on each side at a short distance from the eye, and its free upper margin is regularly convex (Plate XIV. figs. 2, 2*a*).

Wings from the base of the toes; tail wholly contained within the interfemoral membrane; postcalcaneal lobe well developed, nearly as large as, and similar in shape to, that of *C. tuberculatus*.

In the colour and distribution of the fur, the single specimen yet discovered (an adult male preserved in alcohol) appears to agree closely with *C. tuberculatus*, which it also resembles in the form and position of the teeth.

Length, head and body 1″·95, tail 1″·75, head 0″·55, ear 0″·4, tragus 0″·18, forearm 1″·4, thumb 0″·25, third finger 2″·5, fifth finger 1″·9, tibia 0″·6, foot 0″·3.

Hab. Queensland, E. Australia (Peak Downs).

a. ♂ ad., al. (type). Peak Downs, Queensland. Purchased.

3. Chalinolobus gouldii.

Scotophilus gouldii, *Gray, Appendix to Grey's Journ. of two Expeditions of Discovery in Australia*, p. 405.
Chalinolobus gouldii, *Dobson, P. Z. S.* 1875, p. 383.

Head short, crown of the head very slightly raised above the face-line; muzzle broad, obtuse; glandular prominences on the sides much developed, adding to the breadth of the muzzle in front; nostrils prominent above, separated on each side by a small sulcus from the glandular prominences. Ears similar in general outline to those of *Miniopterus schreibersii*; inner margin of the ear very convex forwards in lower half, then sloping almost horizontally backwards to the tip, the position of which is determined only by a slight flattening of the upper third of the outer margin; the lower two thirds of the outer margin is slightly convex, and terminates in a conspicuous lappet of skin hanging vertically downwards, placed at a short distance behind the angle of the mouth. Tragus broad above, reaching its greatest breadth above the middle of the inner margin; the outer margin has a slight convexity near the base, above it a concavity from which the tragus expands considerably outwards, so that the superior part of the outer margin nearly equals the whole inner margin in length; the inner margin is straight or slightly concave. Lower lip with a distinct fleshy lobe, as in *C. tuberculatus* (Plate XIV. fig. 4, head, double natural size).

Feet small; wings to the base of the toes; postcalcaneal lobe rounded, well developed, at a distance equal to the breadth of the foot from the end of the tibia; extreme tip of the tail projecting (Plate XIV. fig. 4*a*).

On the dorsal surface the fur extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the knee, and the base of the interfemoral is occupied by a triangular patch of moderately long hairs. Beneath, the hair extends more densely somewhat beyond a line drawn from the elbow to the knee-joint, a few hairs passing outwards behind the elbow and posterior to the forearm and carpus, ranged along part of the oblique parallel lines traversing the wing-membrane from the forearm backwards, as in *Vesperugo noctula*. The fur covering the head, neck, and shoulders is black, with a very faint reddish tinge; posterior to the point of origin of the antebrachial membrane the fur is dark at the base, the terminal half of the hairs yellowish brown, at the base of the tail and upon the interfemoral membrane yellowish brown throughout. Beneath, on the breast, the bases of the hairs dark, the terminal half reddish or ashy, on the abdomen the extremities of the hairs yellowish white, while on the sides of the body and on the wing- and interfemoral membranes the fur is pale yellowish-white throughout.

Inner incisors unicuspidate and long; outer incisors very short, close to the outer and anterior sides of the bases of the inner incisors (Plate XIV. fig. 4*b*). Lower incisors trifid, crowded. First upper premolar exceedingly small, so minute as to be seen only with the aid of a lens, wedged in between the inner parts of the contiguous edges of the bases of the canine and second premolar, as in *V. noctula*; the second premolar is closely approximated externally to the canine, and the minute first premolar cannot be seen from without. The first lower premolar equals half the second in vertical extent.

Length (of an adult ♀ preserved in alcohol), head and body 2″·4, tail 2″·2, head 0″·75, ear 0″·6 × 0″·45, tragus 0″·28 × 0″·15, forearm 1″·8, thumb 0″·3, third finger 3″·3, fifth finger 2″·15, tibia 0″·75, foot 0″·35. Metacarpal bones of the third and fourth fingers nearly equal in length, that of the fifth finger one tenth of an inch shorter.

Hab. Australia (Queensland; New South Wales; Victoria; South Australia); Tasmania.

a. imm., al.	Peak Downs, Queensland.	Purchased.
b. ♀ ad., al.	Clarence River, N. S. Wales.	Purchased.
c. ad. sk.	Sydney.	Mr. Gould [C.].
d. ♂ ad., al.	Gippsland.	Purchased.
e. ad. sk.	Tasmania.	Lieut. A Smith [P.].
f. ad. sk.	Yarrundi, N. S. Wales.	
g. ad. sk.	New South Wales.	
h. ad. sk.	Tasmania.	R. Maitland, Esq. [P.].

4. Chalinolobus nigrogriseus.

Scotophilus nigrogriseus, *Gould, Mamm. of Australia*, vol. iii. pl. 44.
Scotophilus picatus, *Gould, op. cit.* vol. iv.
Chalinolobus nigrogriseus, *Dobson, P. Z. S.* 1875, p. 385.

Head short, slightly elevated above the face-line; muzzle broad, shortly conical; nostrils prominent on the upper surface of the

muzzle, projecting slightly by their inner margins in front, opening sublaterally, emarginate between, and closer together than in other species of this genus (Plate XIV. fig. 3 *a*). Ears very rhomboidal in outline; the outer and upper angle, forming the tip, rounded off; the lower half of the outer margin slightly reflected backwards at the edge; emarginate opposite the base of the tragus, and terminating in a distinct rounded lobe close to the angle of the mouth, not hanging vertically downwards at its termination as in *C. gouldii* (fig. 3); tragus expanded outwards above, reaching its greatest width above the middle of the inner margin, the breadth of the summit equal to the length of the inner margin, which is straight or slightly concave. On the whole, the form of the tragus is very similar to that of *C. gouldii*.

Wings to the base of the toes; postcalcaneal lobe rounded, well developed, about the breadth of the foot from the tibia; last rudimentary joint of tail free.

Above deep black, the tips with a slight brownish or greyish tinge; beneath similar, the tips ashy and generally of a lighter shade on the pubes and along the sides of the body.

Distribution of the fur and dentition quite similar to those in *Ch. gouldii*.

Length (of an adult ♂ preserved in alcohol), head and body 1″·75, tail 1″·35, head 0″·55, ear 0″·5, tragus 0″·2 × 0″·12, forearm 1″·35, thumb 0″·28, third finger 2″·6, fifth finger 1″·7, tibia 0″·55, foot 0″·28.

Hab. Australia, northern and eastern coasts, Port Essington, Moreton Bay, New South Wales.

a. ad. sk.	Port Essington.	Mr. Gould [C.].
b, *c*. ♂ ad., al.	Port Essington.	Earl of Derby [P.].
d. ♂ ad. sk.	Moreton Bay.	Mr. Gould [C.].
e. ad. sk.	Yarrundi, N.S. Wales.	Labelled *Scotophilus picatus*, Gould.
f. imm. sk.	Australia.	

Premolars $\frac{1-1}{2-2}$. Subgenus GLAUCONYCTERIS.

5. Chalinolobus argentatus.

Chalinolobus argentatus, *Dobson, P. Z. S.* 1875, p. 385.

The crown of the head is abruptly elevated above the face-line as in *Miniopterus*, but to a much less extent; muzzle short, very obtuse in front, broad and flattened above; nasal apertures wide apart in front, separated by a slightly concave space, opening sublaterally, bounded laterally by the front margins of the labial glandular prominences, which are separated from the nostrils above by a sulcus on each side, as in the other species of this genus. Beneath, on each side of the chin, below the under lip, a smooth broad rounded elevation exists, separated from its fellow of the opposite side by the small naked space on the lip in front of the lower incisors. These elevated sides of the chin are covered with short hairs and enclose a

hollow space between. Ears very like those in *Miniopterus*, short and rather sloped backwards; the inner margin commences in a long lobule directed backwards; the margin of the ear is almost regularly convex all round from the commencement of the inner margin to a point in the outer margin opposite the base of the tragus, where it becomes slightly emarginated, and immediately beyond abruptly convex, forming a short erect lobe connected by a low band with a wart in front at the angle of the mouth, which is continuous with a horizontal lappet of thickened skin extending forwards along the lower lip almost as far as a point opposite the lower canine. With this lappet of the lower lip the outer margin of the ear is thus directly continuous. Tragus semilunate, the inner margin slightly concave, the outer regularly convex, at the base a rather large equilateral triangular lobule very acutely pointed (Plate XIV. fig. 5, head, double natural size).

First phalanx of longest finger short, intermediate in length between that of *Miniopterus* and that of *Vesperugo*; terminal phalanx very long, flexed forwards on the under surface of the first phalanx in repose, in this position it extends nearly to the middle of the metacarpal bone. Feet small; wings to the base of the toes; calcaneum long and straight, extending more than half the distance between the ankle and the tip of the tail (Plate XIV. fig. 5 *a*).

Tail as long as the head and body, wholly contained within the interfemoral membrane.

The ears and the face are nearly naked, a few short hairs only appearing on the glandular prominences between the eyes and nostrils; the fur of the body above and beneath extends upon the wing-membranes as far as a line drawn from the middle of the humerus to the middle of the femur; the interfemoral membrane above and beneath is quite naked, except where a small triangular patch of hair appears at the root of the tail.

The fur is tricoloured, the basal third of the hairs black, the middle third white, and the terminal third a beautiful dark silvery grey. This is the arrangement of the colours about the middle of the body; but the grey is more prevalent towards and on the head, while the dark shades prevail slightly over the grey towards the tail.

The integument of the ears and face pearly white; wing- and interfemoral membranes dusky white, translucent, traversed by well-defined reticulations and parallel lines.

The teeth are very peculiar. The inner upper incisors very long, remarkably slender and acute; the outer incisor on each side fills up the space between the inner incisor and the canine by its broad base; but its unicuspidate vertically directed summit is very short, and scarcely exceeds the cingulum of the inner incisor (Plate XIV. fig. 5 *b*). The canines are extremely long and slender, and are directed almost vertically downwards and slightly outwards; the lower canines are also very slender, but scarcely more than half the length of the upper ones. The upper premolar is very acute and close to the canine; the posterior upper molar little more than half the size of

the second molar. The lower incisors are distinctly trifid, some even appearing to have a fourth lobe; they are not crowded, and form a regular semicircle across the wide space between the canines. The lower premolars are also, like the canines, very slender and acutely pointed, the first premolar scarcely half the size of the second.

Length (of an adult ♀ preserved in alcohol), head and body 2″, tail 2″, head 0″·55, ear 0″·5, tragus 0″·22 × 0″·1, forearm 1″·7, thumb 0″·25, second finger 1″·7; third finger—metacarp. 1″·7, 1st ph. 3″·6, 2nd ph. 1″·3; fourth finger—metacarp. 1″·55, 1st ph. 0″·45, 2nd ph. 0″·5; fifth finger—metacarp. 1″·35, 1st ph. 0″·4, 2nd ph. 0″·3; tibia 0″·72, foot 0″·3.

Hab. Cameroon Mountains, western equatorial Africa.

This species has a general resemblance to *Miniopterus schreibersii* in the shape of the head and ears, in the shortness of the first phalanx and great length of the terminal phalanx of the longest finger, in the long and slender tail wholly contained within the interfemoral membrane; added to which the grey colour of the fur and corresponding size would cause specimens of this species to be readily confounded, on a superficial examination, with specimens of the European grey-coloured *M. schreibersii*.

a. ♀ ad., al. (type). Cameroon Mountains, W. Africa. Purchased.

6. Chalinolobus variegatus.

Scotophilus variegatus, *Tomes, P. Z. S.* 1861, p. 36.
Chalinolobus variegatus, *Dobson, P. Z. S.* 1875, p. 388.

Closely allied to *C. argentatus*, which it resembles in general form, in size, and in the colour of the fur. It is, however, readily distinguished by the shortness of the lobule at the base of the inner side of the ear-conch, and by the lower incisors, which are crowded between the canines and placed at right angles to the direction of the jaw. The teeth are similar to those of *C. poensis*, not slender and extremely acute as in *C. argentatus*; and this condition is present in immature specimens also, so that the comparative bluntness of the teeth is not due to age. The head is also longer, the ears larger, and the face is covered with hair to within a short distance from the end of the nose. The lobes of the lower lip are smaller, and the under surface of the lower jaw not raised on the sides as in *C. argentatus*.

The calcaneum is quite similar to that of *C. argentatus*; and there is no postcalcaneal lobe. I have examined the type specimen of this species, and find that the postcalcaneal lobe described by Tomes has been produced by distortion in drying.

Length (of a ♂ preserved in alcohol), head and body 1″·9, tail 1″·8, head 0″·65, ear 0″·6, tragus 0″·22, forearm 1″·55, thumb 0″·3, third finger—metacarp. 1″·4, 1st ph. 0″·6, 2nd ph. 1″; fifth finger—metacarp. 1″·3, 1st ph. 0″·3, 2nd ph. 0″·3; tibia 0″·7, foot 0″·3.

Hab. Otjoro, S.W. Africa.

Type in the collection of the Berlin Museum.

7. Chalinolobus poensis.

Kerivoula poensis, *Gray, Ann. & Mag. Nat. Hist.* 1842, p. 258.
Vesperus (Hesperoptenus) kraussii, *Peters, MB. Akad. Berl.* 1868, p. 638.
Chalinolobus poensis, *Dobson, P. Z. S.* 1875, p. 387.

Smaller than *Ch. variegatus*, but with similarly shaped head and ears; tragus more curved inwards and the lobule at its base less acute; lobes of the lower lip much less developed.

Thumbs and feet as in the preceding species, and similarly black at the extremities, with black claws. Postcalcaneal lobule long and narrow, slightly narrower near the ankle, so that the outline is triangular, the apex of the triangle about the middle, and formed by the extremity of a small cartilaginous prop. Tail contained within the interfemoral membrane, the extreme tip alone projecting.

Fur, above, dark at the base of the hairs, then dull white, the terminal third reddish brown, the extreme tip greyish; the surface of the fur on the head and neck paler than on the back; beneath similar, but with greyish yellow extremities.

Wing- and interfemoral membranes brown, not traversed by strongly marked venations as in the two preceding species. Integument of the ears and face white.

The fur of the body extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the middle of the femur, and upon the interfemoral triangularly as far as the end of the third caudal vertebra. Beneath, the wing-membrane is covered as far as a line drawn from the elbow to the knee-joint, and a few thinly-spread hairs are ranged in short parallel rows on the membrane posterior to the elbow and forearm.

Teeth similar to those of *C. argentatus*, but not so slender, and the upper incisors are more inclined outwards; the first lower premolar is scarcely larger than one of the outer upper incisors. Skull scarcely differing in shape from that of *Ch. argentatus* (Plate XIV. figs. 6, 6 *a*).

Length (of an adult ♀ *), head and body 1″·8, tail 1″·9, head 0″·55, ear 0″·5, tragus 0″·2 × 0″·12, forearm 1″·65, thumb 0″·25; third finger—metacarp. 1″·6, 1st ph. 0″·6, 2nd ph. 0″·95; fourth finger—metacarp. 1″·4, 1st ph. 0″·45, 2nd ph. 0″·45; fifth finger—metacarp. 1″·3, 1st ph. 0″·35, 2nd ph. 0″·35; tibia 0″·65, foot 0″·3.

Hab. W. Africa (Yoruba, Guinea; Fernando Po).

Through the kindness of Dr. Krauss, Director of the Stuttgart Museum, I have been enabled to compare the type of *Vesperus kraussii*, Ptrs., with that of *Kerivoula poensis*, Gray, = *Chalinolobus poensis*, Dobson, and find not the least appreciable difference except in size and colour, the Fernando Po specimen being slightly smaller and paler in the colour of the fur. The figures of the skull of this

* The type of *Vesperus kraussii*, Ptrs. For measurements of the type of *Kerivoula poensis*, Gray (type of this species), see P. Z. S. 1875, p. 388.

species, referred to above, have been taken from the Stuttgart Museum specimen.

a. ♀ad. sk. (in al.) (type). Fernando Po. T. Thomson, Esq. R.N. [P.].

8. SCOTOPHILUS.

Scotophilus, *Leach, Trans. Linn. Soc.* xiii. p. 71 (1822); *Peters, MB. Akad. Berl.* 1866, p. 679; *Dobson, P. Z. S.* 1875, p. 369; *Monogr. Asiat. Chiropt.* p. 119 (1876).

Nycticejus, *Temminck, Monogr. Mammal.* ii. p. 148 (1835–41); *Peters, Reise nach Mossambique, Säugeth.* p. 65 (1852); *Blyth, Journ. As. Soc. Beng.* xx. p. 157 (1851); *Jerdon, Mammals of India*, p. 37 (1867).

Muzzle short, obtusely conical, smoothly rounded off, naked; nostrils close together, opening by simple lunate apertures in front or sublaterally, their inner margins projecting; ears longer than broad, generally considerably shorter than the head, with rounded tips, the outer margin terminating behind the angle of the mouth in a distinct convex lobe; tragus tapering, generally subacutely pointed and curved inwards.

Tail shorter than the head and body, contained, except the terminal rudimentary vertebra, within the interfemoral membrane; calcaneum weak; wings attached or close to the base of the toes. Fur generally short and nearly confined to the body; wing- and interfemoral membranes very thick and leathery.

Skull thick, with prominent crests; occipital and sagittal crests often forming at their junction behind a thick projecting process, from which the skull slopes evenly downwards and forwards to the end of the nasal bones in front; occiput concave, with prominent occipital crest; facial bones much shortened in front of infraorbital foramina, which are large and well defined; the bony palate very narrow behind last upper molar, extending backwards as far as the middle of the zygomatic arches; basioccipital between cochleæ broad; cochleæ partially concealed by the tympanic bullæ; parocipital and mastoid processes well developed, prominent (Plate XV. figs. 5–5*b*, 6–6*b*).

Dentition. Inc. $\frac{1-1}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

An additional external incisor, on each side above, in the young. Upper incisors long, unicuspidate, acute, close to the canines by their bases; upper premolar large, exceeding the molars in vertical extent, and quite close to the canine; last upper molar consisting of a transverse plate only; first lower premolar small, *crushed in between the canine and second premolar*, which exceeds the molars in vertical extent. All the molar teeth very strong, with acute cusps.

Range. The Ethiopian, Oriental, and Australian Regions.

This genus, though difficult to define, and approaching *Vesperugo*, Keys. & Blas., in many points, especially through certain species of that genus, contains a very natural group of Bats of very wide dis-

tribution (as above described) throughout the tropical and subtropical regions of the Eastern Hemisphere. They are distinguished specially by possessing a single pair of upper incisors separated by a wide space and placed close to the canines; by the small transverse first lower premolar crushed in between the approximated canine and second premolar, yet standing in the tooth-row; and, generally, by their short, conical, naked muzzle, and rather short and narrow ears, by their heavy bodies and strong limbs with remarkably thick and nearly naked leathery membranes, and by their short fur, generally olive- or chestnut-brown above, and yellowish or reddish-white beneath.

Owing to the wide distribution and variableness in size and colour of the species of this genus, many different names have been given to the same species; and this variableness and a close external resemblance between different species inhabiting distant countries has caused considerable difficulty in determining species from descriptions either very imperfect or based upon general characters only, such as the colour of the fur and measurements.

Synopsis of Subgenera and Species.

A. Internal basal lobe of the ear angular, inferior margin straight, forming with the ascending margin almost a right angle; tragus with a narrow prominent ridge passing across its front surface from the base of its inner margin ..... Subgen. SCOTOPHILUS.
  a. Upper incisors close to canines; premaxillary bones very narrow, leaving a wide space between them in front, nasal opening very large.
    a'. Cingulum of the upper incisors very narrow.
      α. Forearm 2″·3—2″·45 ..... 1. *Sc. temminckii*, p. 258.
    b'. Cingulum of the upper incisors forming a broad horizontal shoulder behind.
      β. Forearm 2″ ..... 2. *Sc. borbonicus*, p. 260.
      γ. Forearm 3″·4 ..... 3. *Sc. giyas*, p. 261.
B. Internal basal lobes of the ear convex, evenly rounded; front surface of the tragus smooth ..... Subgen. SCOTEINUS.
  a. Ears nearly as long as the head, internal basal lobe commencing in a long lobule projecting backwards; forearm 2″·2 ..... 4. *Sc. emarginatus*, p. 262.
  b. Ears much shorter than the head, internal basal lobe commencing in a short lobule.
    a'. Cingulum of the upper incisors with a small cusp posteriorly; forearm 2″ ..... 5. *Sc. rueppellii*, p. 263.

b'. Cingulum of the upper incisors without a posterior cusp.
a. Lower incisors at right angles to the direction of the jaws; forearm 1″·2 ..... 6. *Sc. greyii*, p. 263.
β. Lower incisors at right angles to the direction of the jaws; forearm 1″·4 ..... 7. *Sc. pallidus*, p. 264.
c. Upper incisors separated from the canines by a short space; premaxillary bones more developed; nasal opening small. Subgen. SCOTOMANES.
c'. Cingulum of the upper incisors with a distinct cusp posteriorly; forearm 2″·35 ..... 8. *Sc. ornatus*, p. 265.

1. Scotophilus temminckii.

? Scotophilus kuhlii, *Leach, Trans. Linn. Soc.* xiii. p. 71 (1822).
Vespertilio temminckii, *Horsfield, Zool. Researches in Java* (1824).
Vespertilio belangeri *et* noctulinus, *Is. Geoff., Bélang. Voy. aux Indes Orient.* (1834) pp. 87 & 92, pl. 3.
Vespertilio castaneus, *Gray, Illustr. Indian Zool.*
Scotophilus temminckii, *Gray, Mag. Zool. & Bot.* ii. p. 497; *Peters, MB. Akad. Berl.* 1866, p. 679; *Dobson, P. Z. S.* 1875, p. 370; *Monogr. Asiat. Chiropt.* p. 120, figs. *a*, *b*.
Nycticejus temminckii, *Temm. Monogr. Mammal.* ii. p. 149; *Wagner, Suppl. Schreb. Säugeth.* i. p. 541 (1841), v. p. 764 (1855); *Cantor, J. A. S. B.* 1846, xv. p. 185; *Blyth, J. A. S. B.* 1851, p. 157; *Horsfield, Cat. Mamm. Mus. E. I. Comp.* p. 37 (1851); *Blyth, Cat. Mamm. Mus. As. Soc. Beng.* p. 31 (1863).
Nycticejus luteus, *Blyth, J. A. S. B.* xx. p. 157, xxi. p. 346; *Wagner, Suppl. Schreb. Säugeth.* v. p. 765 (1855).
Nycticejus flaveolus, *Blyth, Horsfield in Cat. Mamm. Mus. E. I. Comp.* p. 37 (1851).

Muzzle thick, obtusely conical; head slightly raised above the faceline; glandular prominences between the eyes and nose small, not causing a depression on the muzzle above. Ears short, narrow, and rounded at the tips; the inner basal lobe square below, the horizontal part of its margin straight, forming a right angle with the ascending portion, the lower half of the ascending part of the inner margin straight or even faintly concave, the upper half convex, the tip not projecting outwards; from the summit of the ear the outer margin slants slightly outwards and downwards for a short distance, then becomes straight and slightly reflected outwards as far as a point opposite the base of the tragus, where it is deeply emarginate, and beyond which it terminates in a very convex short lobe. Tragus narrow, attenuated towards the tip, acutely pointed, much curved forwards and inwards; the lower third of the outer margin straight, with a distinct small horizontal lobule at the base, the upper two thirds convex; inner margin concave; from the base of the inner margin a narrow prominent ridge passes outwards and slightly upwards across the anterior surface of the tragus to the outer margin.

Wing-membrane attached to the side of the foot near the base of the toes; postcalcaneal lobe narrow; extremity of the tail projecting.

On the upper surface the fur of the body is almost wholly confined to the body, scarcely extending in any direction upon the wing-membrane; beneath, the wing-membrane is covered with fine hairs as far as a line drawn from the elbow- to the knee-joint; the interfemoral is naked, except where a few scattered hairs appear at the base of the tail.

The colour of the fur varies very much in different individuals, and according to season and age. It appears to vary, however, within certain limits. Generally dark olive-brown above, and reddish or yellowish-white beneath; in some specimens deep chestnut throughout, or the inferior surface is bright chestnut or rich canary-colour.

In fully adult and aged animals the skull is thick, with prominent crests; the occipital and sagittal crests form at their junction a thick projecting process, from which the skull slopes evenly downwards and forwards to the end of the nasal bones in front (Plate XX. figs. 6, 6*a*); occiput concave, with prominent occipital crest; facial bones much shortened in front of the infraorbital foramina, which are large and well defined; the bony palate very narrow behind the last molar, extending backwards as far as the middle of the zygomatic arches; basioccipital between cochleæ broad; cochleæ partially concealed by the tympanic bullæ; paroccipital and mastoid processes well developed, prominent.

Length (of an adult ♂), head and body 3″·1, tail 2″·1, head 1″, ear 0″·65, tragus 0″·38 × 0″·1, forearm 2″·3, thumb 0″·38, third finger 3″·65, fifth finger 2″·5, tibia 0″·9, foot 0″·45.

Specimens of this species vary as much in length as they do in colour. Those from the islands of the Malay Archipelago are generally smaller than those from the continent of Asia.

Hab. The Oriental Region (Peninsula of India, Ceylon, Burma, Southern China, Sumatra, Java, Borneo, Philippine Islands).

a. ♂ juv., al.	No locality. (Type of *Scotophilus kuhlii*, Leach.)	
b. ♂ imm., al.	Affghanistan. (Labelled *Scotophilus fulvus*.)	Dr. Horsfield [P.].
c. ad. sk.	Barrackpore, Bengal.	
d. ♂ ad., al.	Barrackpore, Bengal.	
e. ad. sk.	Calcutta.	General Hardwicke [C.].
f, g. ♂ & ♀ ad., al.	Madras.	T. C. Jerdon, Esq. [P.].
h–k. ad. sks.	India.	Captain Boys [C.].
l–n. ad. sks.	India.	Mr. Bartlett [C.].
o–u. ad. sks.		India House Collection.
v. ad. sk.	India.	
w. ad. sk.	Ceylon.	Dr. Kelaart [P.].
x. ♂ ad., al.	Ceylon.	Mr. Cuming.
y. ♂ ad., al.	Ceylon.	
z. ♂ ad. sk.	Pinang.	Dr. Th. Cantor [P.].
a′–c′. ♂ & ♀ ad., al.	Tenasserim Province.	Dr. Oldham [P.].

d'. ad. sk.	Java.	Dr. R. K. Greville [P.].
e'. ad. sk.	Java.	
f'. ad. sk.	Flores.	A. R. Wallace, Esq. [C.].
g'. ♂ ad., al.	Negros.	Purchased.
h'–j'. ♂ & ♀ ad., al.	Erumango.	Mr. Cuming [C.].
k'–m'. ♀ ad., al.	Philippine Islands.	Mr. Cuming [C.].
n'. ♂ ad., al.	Philippine Islands.	Zool. Soc. Collection.
o'–q'. ♂ & ♀ ad., al.		M. Lidth de Jeude [C.].
r'. ♂ ad., al.		Zool. Soc. Collection.
s'. ♀ ad., al.		Sir A. Smith [P.].
t'. ♀ ad., al.		Sir E. Belcher [C.].
u'. ♂ imm., al.		
v'–x'. skulls.		
y', z'. skeletons.		

Var. *a*.

Scotophilus heathii, *Dobson, Monogr. Asiat. Chiropt.* p. 122, fig. (1876).
Nycticejus heathii, *Horsfield, P. Z. S.* 1831, p. 113.

In general form and size very similar to *Sc. temminckii*, but in all measurements longer; the forearm, thumb, and tail are relatively longer, and the crown of the head appears less elevated above the face-line. The muzzle also seems more conical, owing to the greater breadth and more rounded form of the face.

Length (of an adult ♂), head and body 3″·2, tail 2″·5, head 1″·1, ear 0″·75 × 0″·5, tragus 0″·38 × 0″·1, forearm 2″·45, thumb 0″·45, third finger 4″, fifth finger 2″·75, tibia 1″, foot 0″·5.

Hab. Peninsula of India (Coromandel and Malabar coasts; Rajanpur, Punjab frontier); Ceylon.

a. ♀ ad., al.	India.	General Hardwicke [C.].
b. ♀ ad., al.	India.	General Hardwicke [C.].
c. ad. sk.		Captain Boys [C.].
d. ♀ ad., al.	No history.	
e. skull.		Captain Boys [C.].
f. skull of *a*.		

2. Scotophilus borbonicus.

? Vespertilio nigrita, *Schreb. Säugeth.* i. p. 171, pl. 58 (1775).
Vespertilio borbonicus, *Geoffr. Ann. du Mus.* i. p. 201, pl. 46 (1800).
Nycticejus leucogaster, *Cretzschmar, Rüppell, Atlas, Reise nördl. Afrika, Zoolog.* (1826), p. 71, pl. 28 *a*; *Temm. Monogr. Mammal.* ii. p. 153 (1840); *Wagner, Suppl. Schreb. Säugeth.* i. p. 543.
Vespertilio dinganii, *Smith, S. African Quart. Journ.* 1832, p. 27.
Scotophilus dinganii, *Smith, Illustr. S. African Zoology*, pl. 53.
Nycticejus dinganii, *Wagner, op. cit.* v. p. 769 (1855).
Nycticejus planirostris *et* viridis, *Peters, Reise nach Mossambique, Säugeth.* pp. 65–67 (1852); *Wagner, l. c.* pp. 769, 770.
Scotophilus borbonicus, *Peters, C. von der Decken, Reisen im äquat. Ost-Afrika*, p. 7 (1869); *Dobson, P. Z. S.* 1875, p. 370.

Resembles *Sc. temminckii* very closely in general form, but may be distinguished by the following characters:—The ear is slightly

longer compared with the length of the head, and the terminal lobe at the base of the outer margin smaller; the outer margin is straight from a point opposite the base of the tragus to the tip, not curved inwards and upwards to meet the inner margin as in *Sc. temminckii*; the tragus is conspicuously larger, and the transverse ridge on its anterior surface much less defined. The thumb is much shorter.

The fur of the body is longer, and extends further upon the wing-membranes than in *Sc. temminckii*, especially beneath, where fine hairs thinly cover the basal half of the interfemoral membrane.

Above olive-brown, pale yellowish-white beneath.

The cingulum of the upper incisor on each side is greatly developed in a horizontal plane backwards and outwards, *forming a broad shoulder* on this side of the tooth, slightly raised above the level of the gum. Lower incisors indistinctly trifid, and slightly crowded. Lower premolars as in *Sc. temminckii*.

Length (of an adult preserved in spirits), head and body 2″·7, tail 2″·2, head 0″·85, ear 0″·7, tragus 0″·35, forearm 2″, thumb 0″·3, third finger 3″·6, fifth finger 2″·4, tibia 0″·8, foot 0″·4.

Hab. Ethiopian Region (apparently generally distributed, from Senegambia and Nubia to Angola, Kaffraria, Natal, Mozambique, Cape Colony, Isle of Bourbon).

a. ad. sk.	North Africa.	Mr. Fraser [C.].
b. ♀ ad., al.	West Coast of Africa.	Captain Speke [P.].
c. ♂ ad., al.	Abyssinia.	Purchased.
d. ♂ ad., al.	Angola.	
e. ♀ imm., al.	Zanzibar.	Purchased.
f. ♂ ad., al.	King William's Town.	Lieut. H. Trevelyan [P.].
g. ad. sk.	South Africa.	Stockholm Museum.
	(*Sc. dinganii*, Smith.)	
h. ad. sk.		Mr. Bartlett [C.].
i. skull of *c*.		
j. skull of *f*.		

3. Scotophilus gigas.

Scotophilus gigas, *Dobson, Ann. & Mag. Nat. Hist.* 1875, xvi. p. 122.

Ear-conch and tragus like those of *S. borbonicus*, Geoffr.; but the internal basal lobe of the ear is more rounded and its inferior horizontal margin is straight, not in the least degree concave; the upper third of the outer margin of the conch is slightly but distinctly concave; and the tragus has the narrow ridge, proceeding from the base of its inner margin across its front margin, as well developed as in *S. temminckii*.

Wings to the metatarsus near the base of the toes; last two caudal vertebræ and half the third last vertebra free.

Fur above deep chestnut, beneath yellowish white. The fur on the upper surface is short and does not extend anywhere upon the membranes, terminating by a well-defined line, and not extending posteriorly as far as the root of the tail; beneath, the wing-membrane is thinly covered as far as a line drawn from the elbow to the knee-joint, and a band of fur passes outwards, posterior to

the forearm, to the carpus, as in *Vesperugo noctula*. The face in front of the eyes is nearly naked.

Upper incisors with a posterior horizontal expansion of the cingulum, as in *Sc. borbonicus*; lower incisors crowded. The other teeth as in *Sc. temminckii*.

Length, head and body 4″·6, tail 3″·6, free from membrane 0″·35, head 1″·45, ear 0″·9, tragus 0″·45, forearm 3″·4, thumb 0″·7; third finger—metacarp. 3″·2, 1st ph. 1″·2, 2nd ph. 1″·35; fifth finger—metacarp. 2″·9, 1st ph. 0″·65, 2nd ph. 0″·6; tibia 1″·4, foot 0″·75.

Hab. West Africa (Lagos).

a. ♀ ad., al.		Lagos.	Purchased.

4. Scotophilus emarginatus.

Nycticejus emarginatus, *Dobson, Proc. As. Soc. Beng.* 1871, p. 211.
Scotophilus emarginatus, *Dobson, Monogr. Asiat. Chiropt.* p. 123, figs. *a*, *b* (1876).

Head broad and flat; muzzle thick and obtusely conical; glands of the upper lip largely developed, forming rounded prominences between the nostrils and eyes; nostrils opening level with intervening space; ears large, with broadly rounded tips; inner margin of the ear-conch convex, with a rounded lobe at the base directed backwards and slightly outwards, passing in front of the inner margin of the tragus and resting on part of its anterior surface; outer side abruptly flatly emarginate beneath the tip, causing it to project outwards, again angularly emarginate opposite the base of the tragus, terminating in a rounded lobe with a wart in front between it and the angle of the mouth; tragus moderately long, slightly curved inwards and obtusely pointed, maintaining almost the same breadth from the base to within a short distance from the tip, where it suddenly diminishes in width.

Thumb long, armed with a large and strong claw; terminal phalanx about twice as long as basal. Tail of nine vertebræ, the last free.

The wing-membranes are completely devoid of hair, except in the immediate neighbourhood of the sides of the body, above and beneath; behind the fur of the back extends upon the interfemoral membrane, covering about half its surface, rather densely at the root of the tail, but quickly thinning out into a few short scattered hairs, which also extend on the backs of the tibiæ to the feet; beneath, the membrane is naked, except at the root of the tail, where a few scattered hairs occur.

The body is clothed with short close fur, above tricoloured, at the base dark ferruginous brown, then buff, the tips light yellowish brown; beneath dark ferruginous brown at base, the remaining portion buff.

Length (of an adult ♂ preserved in alcohol), head and body 2″·9, tail 2″·2, head 0″·95, ear 0″·85, tragus 0″·3 × 0″·1, forearm 2″·2, thumb 0″·45, third finger 3″·7, fifth finger 2″·8, tibia 0″·85, calcaneum 0″·8, foot 0″·55.

Hab. India, precise locality unknown.

Type in the collection of the Indian Museum, Calcutta.

5. Scotophilus rueppellii.

Nycticejus rüppellii, *Peters, MB. Akad. Berl.* 1866, p. 18.
Scotophilus rueppellii, *Dobson, P. Z. S.* 1875, p. 371.

Ears about the same length as in *Sc. temminckii*; the internal basal lobe short, rounded; lower half of the inner margin of the ear regularly convex, upper half straight; tip obtusely rounded, outer margin commencing abruptly by a small concavity beneath the tip, causing it to project slightly outwards, then slightly convex downwards, emarginate opposite the base of the tragus, and terminating in a convex lobe. Tragus shorter, subacutely pointed, and less curved inwards and forwards than in *Sc. temminckii*, the lobule at the base of the outer margin succeeded by a shallow emargination, terminated above, slightly below the middle of the outer margin, by a prominent tooth, above which the margin becomes slightly convex; inner margin straight below, slightly concave in upper third; no transverse ridge on the outer surface of the tragus (Plate XV. fig. 2).

Fur similar in distribution to that of *Sc. temminckii*, but somewhat longer and of a darker shade. Some specimens are very dark brown above, the extreme tips slightly ashy; beneath dark brown, the terminal one fourth of the hairs ashy. In others the fur has a chestnut tinge throughout.

The cingulum of each upper incisor develops a minute cusp posteriorly and externally. The lower incisors are more crowded between the canines than in *Sc. temminckii*, forming by their arrangement an acute angle.

Length (of an old ♀ with worn teeth), head and body 2″·8, tail 1″·9, head 0″·9, ear 0″·7, tragus 0″·3, forearm 2″, thumb 0″·4, third finger 3″·5, fifth finger 2″·25, foot 0″·48.

Hab. Australia (Sydney, New South Wales).

a.	♀ ad., al.	Port Jackson, Australia.	Purchased.
b.	♀ ad., al.	Sydney.	Purchased.

6. Scotophilus greyii.

Scotophilus greyii, *Gray, List of the Specimens of Mammalia in the British Museum*, 1843 (not described); *Voy. 'Erebus' and 'Terror,'* 1844, pl. 20 (not described); *Dobson, P. Z. S.* 1875, p. 372.

Crown of the head slightly elevated above the face-line; muzzle flat above, rather broad, glandular prominences on the sides of the face moderately developed: ears short, triangular, shortly rounded off above; basal lobe of inner margin rounded, ascending portion slightly convex, emarginate opposite the base of the tragus, and terminating in a distinct rounded lobe. Tragus broad, obtuse, with a triangular lobule near the base; inner margin straight, outer straight below, sloping inwards above from a point opposite the middle of the inner margin (Plate XV. fig. 4).

Wings to the base of the toes; postcalcaneal lobe small, but distinct, rounded, placed on the calcaneum at a distance from the ankle equal to the breadth of the foot; last caudal vertebra free.

Above chestnut-brown throughout; beneath similar, the extreme points of the hairs ashy.

On both surfaces the fur of the body is short: the face in front of the eyes is nearly naked, and the wing- and interfemoral membranes are clothed with a few thinly spread hairs along the sides of the body only.

Upper incisors close to base of canines, inclined forwards and inwards; lower incisors not crowded, indistinctly lobed; lower canines without internal basal cusp; first lower premolar small and blunt, crushed in between the canine and second premolar and pushed slightly inwards; posterior upper molar equal to half antepenultimate molar.

Length (of an adult male specimen, the type), head and body 1″·75, tail 1″·2, head 0″·6, ear 0″·5, tragus 0″·2, forearm 1″·2; third finger—metacarp. 1″·2, 1st ph. 0″·53, 2nd ph. 0″·65; fifth finger—metacarp. 1″·2, 1st ph. 0″·3, 2nd ph. 0″·2; tibia 0″·45, foot 0″·25*.

Hab. Australia (Port Essington, Liverpool Range).

a. ♂ ad., al. (type).	Port Essington.	Earl of Derby [P.].
b–d. ad. sks.	Port Essington.	
e. ad. sk.	Liverpool Range.	

7. Scotophilus pallidus.

Scotophilus pallidus, *Dobson, Monogr. Asiat. Chiropt.* p. 186 (1876).

Head and muzzle as in *Sc. temminckii*. Ears shorter than the head, the internal basal lobe convex, evenly rounded; the ascending inner margin slightly convex; tip rather broadly rounded off; the outer margin straight for half its length, concave opposite the base of the tragus and terminating in a convex lobe; tragus moderately long, and rounded at the tip, not attenuated above, anterior surface smooth, inner margin straight or faintly concave, outer slightly convex, a prominent triangular lobule near its base (Plate XV. fig. 3).

Wings from the base of the toes; calcaneum weak; postcalcaneal lobule long and very narrow; last rudimentary caudal vertebra free.

Fur, above, light chestnut-brown; beneath, brownish buff; the base of the hairs on both surfaces pale buff. In some specimens, the fur is pale buff throughout, and the integument of the body and the volar membranes are of the same light colour.

Dentition as in *Sc. temminckii*.

Length (of an adult ♂ preserved in alcohol), head and body 2″, tail 1″·4, head 0″·7, ear 0″·55, tragus 0″·23, forearm 1″·4, thumb 0″·25; third finger—metacarp. 1″·3, 1st ph. 0″·45, 2nd ph. 0″·7; fifth finger—metacarp. 1″·3, 1st ph. 0″·35, 2nd ph. 0″·2; tibia 0″·48, foot 0″·28.

Hab. Peninsula of India (Mian Mir, near Lahore; Scinde).

Type in the collection of the Indian Museum, Calcutta.

a. imm. ♂, al.	? India.	Purchased.

* In my Monograph of the genus *Scotophilus* in P. Z. S. 1875, p. 372, the measurements of a different species were accidentally given instead of the above.

8. Scotophilus ornatus.

Nycticejus ornatus, *Blyth, J. A. S. B.* xx. p. 517.
Scotophilus ornatus, *Dobson, P. Z. S.* 1875, p. 371; *Monogr. Asiat. Chiropt.* p. 124, figs. *a*, *b* (1876).

Muzzle broad and obtuse; glandular prominences of the upper lip well developed, seminude, bounded behind by a deep groove passing backwards and outwards on either side from the nostrils; in front of these grooves the long hair covering the head does not pass; ears moderate, triangular, with broadly rounded tips, outer side with a slight concavity beneath the tip, then convex, again emarginate opposite the base of the tragus, and terminating in a broadly rounded lobe; the small wart near the termination of the outer margin is not so well defined as in other species of the genus, and in some specimens is either absent or very small; tragus long, slightly narrowed above the small triangular lobe at the base, then somewhat expanded and again narrowed towards the tip, which is rounded off or subacutely pointed, with a faint concavity immediately beneath on the inner margin. Tail long; last vertebra free.

Fur light isabelline brown, remarkably pied with white spots; on the top of the head a small longitudinal patch of pure white; from the back of the head for two thirds the length of the spine a narrow band of white extends; at the base of the ears posteriorly a patch of white; on each side of the body two white patches, one in front of, the other behind the head of the humerus; on the under surface a band of white round the neck connects the spots behind each ear, this is succeeded by a band of isabelline brown, followed by a band of white and succeeded by pale brown, which extends to the root of the tail. In a young specimen the general colour is dark isabelline brown, and the narrow band of the same colour round the neck on the under surface is succeeded by glistening silvery white fur, which, becoming greyish posteriorly, extends over the whole ventral surface, interrupted only by a small patch of isabelline brown, on each side, immediately beneath the head of the humerus.

The position of the white patches is generally very constant; but their size varies, being greatest apparently in individuals of a pale rusty red colour; and these I have always found to be males; the females have much darker fur, and the white spots and bands are of less size and are occasionally altogether absent in some places.

If the skull of *S. ornatus* be compared with that of a full-grown specimen of *S. temminckii*, the following differences may be observed:—

In *S. temminckii* the superior angle of the occipital crest forms with the sagittal crest a prominent projection; in *S. ornatus* this projection is small, the sagittal crest is more developed in front, and the postorbital processes are larger. The frontal in *S. ornatus* is grooved in the centre; in *S. temminckii* it forms a plane surface. In *S. ornatus* the premaxillary bones are much more developed, and the nasal opening is not half the size of that in *S. temminckii*; the incisors also are placed at the inner side of the premaxillaries, and

separated from the canines by a space. In *S. ornatus* the bony palate is much broader behind the last molars, and does not extend so far backwards (Plate XV. fig. 6 *a*).

In the upper jaw the teeth (with the exception of the incisors, which are separated from the canines, and have an acute short posterior cusp) are very similar in both species; in the lower jaw the first premolar is less crushed in between the canine and second premolar than in any other species of the genus; it is, however, similarly flattened from before backwards, and has two short cusps arising internally from the cingulum which are not found in the other species (fig. 6 *b*).

Length, head and body 3″·1, tail 2″·5, head 0″·9, ear 0″·95 × 0″·55, tragus 0″·4 × 0″·1, forearm 2″·35, thumb 0″·5, third finger 4″·2, fifth finger 3″, tibia 0″·9, calcaneum 0″·9, foot 0″·5.

Hab. India (Darjiling, Khasia hills); Burma (Ponsee and Kakhyan hills); Yunan (Mantin and Sanda valley).

Type in the collection of the Indian Museum, Calcutta.

a. ♂ ad., al. Darjiling. G. E. Dobson, M.B. [E.].

9. NYCTICEJUS.

Nycticejus, *Rafinesque, Journ. de Physique*, lxxxviii. p. 417 (1819); *Allen, Monogr. Bats of North America*, p. 11 (1864).

Head and ears as in *Vesperugo*; crown of the head scarcely elevated above the face-line; wings from the base of the toes; post-calcaneal lobule indistinct.

Dentition. Inc. $\frac{1-1}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

Upper incisors close to the canines; the first lower premolar not crushed in between the canine and second premolar as in *Scotophilus*; last upper molar equal to half the antepenultimate molar.

Range. The Nearctic Region (Alleghany and Rocky Mountain Subregions).

1. Nycticejus crepuscularis.

Nycticejus crepuscularis, *Leconte, Cuv. An. Kingd.* (*ed. M'Murtrie*) i. p. 432 (1831); *Proc. Acad. Nat. Sci. Philad.* 1855, p. 433; *Allen, Monogr. Bats N. America* (1864), p. 12, figs. 9–11.

Vespertilio creeks, *F. Cuv. Nouv. Ann. du Mus.* i. p. 18 (1832).

Vespertilio ænobarbus, *Temminck, Monogr. Mammal.* ii. p. 247, pl. 58. fig. 4 (1835–41), *vide Peters, MB. Akad. Berl.* 1866, p. 681.

Vesperus cubanus, *Gundlach, MB. Akad. Berl.* 1866, p. 681.

Head flat; muzzle broad; glandular prominences between the eyes and nostrils large, causing a depression on the face between and behind them. Ears triangular, internal basal lobe rounded, ascending part of inner margin faintly convex; outer margin straight, slightly emarginate opposite the base of the tragus, terminating without forming a lobe in front, separated from the angle of the mouth by a small wart. Tragus rather short, inner margin

straight, outer margin straight below with a distinct triangular lobule, sloping inwards to form the tip from a point slightly above the middle of the inner margin.

Wings from the base of the toes; toes slightly more than half the length of the foot; postcalcaneal lobe small, indistinct; calcaneum weak, termination indistinct; the last caudal vertebra quite free.

The fur is rather short; the face in front of the eyes is nearly naked, and the wing-membranes are covered only along the sides of the body; a triangular patch of hair extends from the back upon the upper surface of the interfemoral.

Above brown, with yellowish-brown tips; beneath similar, with paler or ashy extremities.

The upper incisors are acutely pointed, separated by a narrow interval from the canines, directed forwards and slightly inwards. Space between the canines, both in the upper and lower jaws, very wide, much wider than in the Old-World *Scotophili*. Lower incisors distinctly trifid and crowded. The canines develop no internal basal cusp. First lower premolar small, in the tooth-row, not crushed in between the canine and second premolar, acutely pointed, about half the vertical height, but not half the transverse diameter of the second premolar. Posterior upper molar equal to half the second molar.

Length (of an adult ♀ preserved in spirits), head and body 2″, tail 1″·4, head 0″·65, ear 0″·55, tragus 0″·22, thumb 0″·3, forearm 1″·4, third finger 2″·5, fifth finger 1″·75, tibia 0″·45, foot 0″·28.

Hab. North America; from New York to the Rocky Mountains, and southwards to New Orleans and to the West-Indian Islands (Cuba).

a. ad. sk.	No locality or donor.
b. ad. ♀, al.	Georgia, N. America.
c. ad. sk.	Central America.

10. ATALAPHA.

Atalapha, *Rafinesque, Précis des découvertes et travaux somiologiques*, p. 12 (1814); *Desm. Mamm.* p. 146 (1820); *Gervais, Hist. Nat. Mammif.* i. p. 214 (1854); *Peters, MB. Akad. Berl.* 1870, p. 907.
Scotophilus, *Gray, Mag. Zool. & Bot.* ii. p. 498 (1838).
Lasiurus, *Gray, List Mammalia Brit. Mus.* (1843); *Tomes, P. Z. S.* 1857, p. 34; *Allen, Bats of N. America*, p. 14 (1864).

Muzzle obtuse, the broad extremity of the nose projects slightly beyond the lower lip; nostrils simple, opening sublaterally in front by lunate apertures, and rather widely separated; head scarcely raised above the face-line; ears generally broad and rhomboidal, the outer side prolonged forwards and ending in a lobular projection near the angle of the mouth; tragus narrow at the base and much expanded above, the upper half suddenly curved inwards so that its general shape is that of a reversed L; this peculiar shape of the tragus is very characteristic of the genus.

Interfemoral membrane more or less densely covered with hair on its upper surface. In some species the whole of the upper surface of the interfemoral is densely clothed with fur, which also extends upon the wing-membrane for a considerable distance, and passes outwards in a broad band behind the forearm to the carpus (see Plate XVI. fig. 1).

Dentition. Inc. $\frac{1-1}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$ or $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

Upper incisors unicuspidate and acutely pointed, close to the canine on each side, directed forwards and inwards. In the species with two upper premolars the first premolar is very small, and is placed in the inner angle between the closely approximated canine and second premolar. Skull broad and flat, frontal bone slightly grooved (Plate XVI. fig. 1 *a*).

Range. The Nearctic and Neotropical Regions, from Canada to Southern Chili.

The species of this genus with a single upper premolar agree in the number of their teeth with *Nycticejus*, and also with *Scotophilus*, which is limited to the Eastern Hemisphere, but are easily recognised by the peculiar form of the ears and especially of the tragus, and by the distribution of the fur.

The relative development of the minute first upper premolar has been used to distinguish some forms; but it is evident that, in a genus where this tooth is altogether absent in certain species, its relative size in those species which possess it can scarcely be considered of sufficient importance to lead to the formation of new species.

Synopsis of Subgenera and Species.

I. Premolars $\frac{2-2}{2-2}$; the whole upper surface of the interfemoral membrane clothed with hair ..... Subgen. ATALAPHA.
  a. Forearm quite naked; fur reddish ashy ..... 1. *A. noveboracensis*, p. 269.
  b. Forearm with a small patch of hairs near the elbow; fur generally brownish ashy ..... 2. *A. cinerea*, p. 272.

II. Premolars $\frac{1-1}{2-2}$; the posterior half or third of the interfemoral membrane naked .. Subgen. DASYPTERUS*.
  c. The posterior third of the interfemoral naked.
    a'. Tragus obtuse, curved inwards; fur olive-brown ..... 3. *A. intermedia*, p. 274.
    b'. Tragus subacute, straight, the tip only curved inwards; fur bright reddish ..... 4. *A. egregia*, p. 275.
  d. The posterior half of the interfemoral naked.
    c'. Tragus subacute, curved inwards; fur pale yellowish brown ..... 5. *A. ega*, p. 276.

* *Dasypterus*, Peters, MB. Akad. Berl. 1870, p. 904.

Premolars $\frac{2-2}{2-2}$. Subgen. ATALAPHA.

1. Atalapha noveboracensis.

? Vespertilio lasiurus, *Schreber, Säugethiere*, i. pl. lxii. B (1775); *Geoffr. Ann. du Mus.* viii. p. 200 (1806); *Desmarest, Mammalogie*, p. 142 (1820).

Vespertilio noveboracensis, *Erxleben, Syst. Reg. Anim.* p. 155 (1777); *Godman, Amer. Nat. Hist.* i. p. 50 (1826); *Cooper, Ann. Lyc. Nat. Hist. New York*, iv. p. 57 (1837); *Leconte, Proc. Acad. Nat. Sci. Philad.* 1855, p. 432.

Vespertilio rubellus, *P. de Beauvois, Catal. Peale's Mus. Philad.* viii. p. 201 (1796) [*vide Allen, Bats of North America*, p. 16 (1864)].

? Vespertilio villosissimus, *Geoffroy, l. c.* p. 204 (1806).

Atalapha americana, *Rafinesque, Précis des découvertes, &c.* p. 12 (1814).

Vespertilio tesselatus, *Rafinesque, Amer. Month. Mag.* iv. p. 445 (1817).

? Vespertilio bonariensis, *Lesson, Voy. de la Coquille*, i. p. 137 (1829).

Vespertilio blosseivillii, *Lesson et Garnet, Bullet. de Sci. Nat.* viii. p. 95; *Gervais, in Ramon de la Sagra's Hist. de l'île de Cuba, Mammif.* p. 32, pl. i. (1838).

Nycticejus noveboracensis, *M'Murtrie, Append. Cuv. Anim. Kingd.* (*New York*, 1831) p. 432.

Nycticejus lasiurus *et* noveboracensis, *Temminck, Monogr. Mammal.* ii. pp. 156, 158 (1835–41); *Wagner, Suppl. Schreb. Saugeth.* i. p. 545 (1844), v. p. 771 (1855).

Lasiurus rufus, *Gray, List of Mammals Coll. Brit. Mus.* p. 32 (1843).

Lasiurus noveboracensis, *Tomes, P. Z. S.* 1857, p. 34; *Allen, l. c.* p. 16.

Atalapha noveboracensis, *Peters, MB. Akad. Berl.* 1870, p. 908.

Muzzle broad, obtuse, glands of the upper lip much developed, adding to the width of the lip, which consequently projects laterally and in front beyond the lower lip; end of nose broad, faintly concave between the nostrils, which are rather widely separated and open laterally, their inner edges not projecting. Ear short and broad, the horizontal portion of the inner margin forms almost a right angle with the ascending front portion, which attains its greatest convexity about the middle; tip broadly rounded; outer margin straight or slightly concave beneath, then reflected backwards and terminating in a rather large convex lobe (of which the front margin is marked by an angular emargination) close to the angle of the mouth, from which a small wart separates it. Tragus broad in the middle, with a rather narrow obtuse extremity curved inwards; the lower half of the inner margin straight, the upper half concave, at the base of the outer margin a triangular lobe, from which the outer margin slopes outwards, attaining its greatest width slightly below the middle of the inner margin, then slopes upwards and inwards, forming an angle below.

Wings from the base of the toes. No postcalcaneal lobe. The extreme tip of the tail projecting.

The face (except the labial prominences) and the head are thickly covered with fur, which is almost as long as the ears. On the wing-membrane the fur on the upper surface extends very densely as far as a line drawn from the middle of the humerus to the base of the toes (when the legs are extended outwards as when flying); the interfemoral membrane to the extreme posterior edge, beyond which a fringe of long hairs projects, the legs, and the back of the feet are almost as thickly covered as the body of the animal. Beneath, the fur extends upon the wing-membrane behind the humerus and forearm as far as a line drawn from the extended knee to the junction of the proximal and middle thirds of the fifth metacarpal bone; occupying also the angle between the fifth and fourth fingers, and extending backwards upon the membrane in a narrow line for three fourths the length of the metacarpal of the longest finger. A small tuft of white hairs appears above at the base of the thumb, and a line of short hairs extends backwards on the proximal half of the dorsum of the metacarpal bone of the fifth finger; the forearm is quite naked.

Above, pale straw-colour at the base and for three fourths the length of the hairs, the extremities bright reddish chestnut (or brownish red in specimens from the northern parts of N. America), minutely tipped with grey, so that the surface of the fur appears dusted with a fine ash; on the interfemoral membrane bright chestnut throughout. Beneath, on the neck similar to the upper surface but paler; on the chest and abdomen black at the base, with reddish-yellow extremities; below the point of origin from the shoulder of the antebrachial membrane a patch of pure white exists on either side, connected across the chest by broad irregular, and occasionally very indistinct, bands of white.

The ears, the antebrachial membrane, and that part of the wing-membrane covered by hair beneath is of the same tint as the fur of the body, and the same bright colour prevails along the fingers. The rest of the membranes dark brown or black, dotted with small yellow points.

The first upper premolar minute, in the angle between the canine and second premolar; middle lower incisors largest and trifid, the others smaller and smooth.

Length, head and body 2″, tail 1″·8, ear 0″·5, tragus 0″·3, forearm 1″·5, thumb 0″·35, third finger 3″·1, fifth finger 1″·9, tibia 0″·75, foot 0″·35.

Hab. Generally distributed throughout the Nearctic Region from Canada to Texas; represented in the Neotropical Region by three or more varieties described below.

The following have been described as distinct species:—

Var. α (*Atalapha frantzii*).

Atalapha frantzii, *Peters, MB. Akad. Berl.* 1870, p. 908.

This, which may be considered the tropical form of *A. noveboracensis*, differs from typical specimens in the slightly smaller size of the ears, the shorter and more pointed tragus, the naked margin of the interfemoral membrane, and the shorter fur on the wing-membrane behind the forearm. The extremities of the hairs on the upper surface are brighter red, and scarcely (in some specimens not) tipped with grey.

The measurements agree very closely with those of specimens of *A. noveboracensis* from North America; the metacarpal bone of the middle finger and the tibia appear to be proportionately slightly longer.

Hab. Central America (Guatemala; Costa Rica); Brazil; Chili.

Var. β (*Atalapha pfeifferi*).

Atalapha pfeifferi, *Gundlach, MB. Akad. Berl.* 1861, p. 152.

Slightly larger than the preceding form, which it resembles in the colour and distribution of the fur, which also thinly covers the interfemoral membrane posteriorly. It is chiefly distinguished by the larger size of the small first upper premolar.

Length, head and body 2″·1, tail 1″·75, head 0″·65, ear 0″·5, tragus 0″·3, forearm 1″·75, third finger 3″·15, fifth finger 2″·15, tibia 0″·8, calcaneum 0″·8, foot 0″·35.

Hab. Cuba.

Var. γ (*Atalapha varia*).

Nycticejus varius, *Poeppig, Reise in Chile*, i. p. 451 (1835).
Atalapha varia, *Peters, MB. Akad. Berl.* 1870, p. 909.

This form is distinguished from *A. noveboracensis* by the much larger size of the first upper premolar, and by the uniform black colour of the wing-membranes. Neither of these characters are, in my opinion, sufficient in this family to found a species upon. The size of the first upper premolar is very variable, and the intermediate condition of this tooth is seen in the preceding variety. The yellow spaces along the finger and the dots observed in the wing-membranes of *A. noveboracensis* are not always present in specimens from N. America.

Length (of an adult ♂ in the collection of the Berlin Museum), head and body 2″, tail 2″, ear 0″·5, tragus 0″·28, forearm 1″·6, thumb 0″·35, third finger 3″·1, fourth finger 2″·5, fifth finger 2″, tibia 0″·75, foot 0″·33.

Hab. Peru, Chili.

a, b. ad. sk.	Canada.	P. W. Malagan, Esq. [P.].
c, d. ad. sk.	New York.	— Drummond, Esq. [P.].
e. ad. sk.	New York.	Purchased.

f. ♂ ad., al.	New York.	Purchased.
g. ♀ ad., al.	New York.	
h–j. ad. sk.	North America.	J. Gould, Esq. [P.].
k. ♂ ad., al.	North America.	Dr. J. Green [P.].
l. ♀ ad., al.	St. Louis.	Smithsonian Institute [P.].
m, *n*. ♂ & ♀ ad., al.	St. Louis.	Smithsonian Institute [P.].
o. ad. sk.	No history.	
p, *q*.		M. Lidth de Jeude [C.].
	Var. *a* (*A. frantzii*, Peters).	
r. ad. sk.	Dueñas, Guatemala.	O. Salvin, Esq. [C.].
s. ♀ ad., al.	Dueñas, Guatemala.	O. Salvin, Esq. [C.].
t, *u*. ♂ ad., al.	Jamaica.	P. H. Gosse, Esq. [C.].
v. ad. sk.	Pernambuco.	J. P. G. Smith, Esq. [P.].
w, *x*. ad. sk.	Brazil.	
y. ad. sk.	Chili.	Purchased.
z. ♂ ad., al.	Mendoca.	Purchased.
a'. ad. sk.		
b'. skull of *o*.		
c'. skull of *w*.		

2. Atalapha cinerea.

Vespertilio cinereus, *Palisot de Beauvois, Catal. Peale's Mus. Philad.* 1796 (vide *Allen, Bats of N. America*, p. 21).

Vespertilio pruinosus, *Say, Long's Exped. Rocky Mount.* p. 67 (1823); *Cooper, Ann. Lyc. New York*, iv. p. 54 (1837).

Scotophilus pruinosus, *Gray, Mag. Zool. & Bot.* ii. p. 498 (1838).

Nycticejus pruinosus, *Temminck, Monogr. Mammal.* ii. p. 154 (1835–41); *Wagner, Suppl. Schreb. Säugeth.* i. p. 544 (1844), v. p. 770 (1855).

Lasiurus pruinosus, *Gray, List of Mammalia in Coll. Brit. Mus.* (1843); *Tomes, P. Z. S.* 1857, p. 37.

Lasiurus cinereus, *H. Allen, l. c.*; *J. A. Allen, Mammals of Massachusetts*, p. 208.

Atalapha cinerea, *Peters, MB. Akad. Berl.* 1870, p. 910.

The muzzle, nostrils, and ears are very similar in shape to those of *A. noveboracensis*, except that the inner margin of the ear is more evenly rounded, and the terminal lobe of the outer margin near the angle of the mouth is not incised in front. The tragus attains its greatest width opposite the base of the inner margin, forming there an acute angular projection, or elbow; at the base of the outer margin a small rounded lobe, the outer margin then slopes outwards to this angle, from which it slopes upwards and inwards to the tip; about four fifths of the inner margin is straight, then slightly convex above, causing the rounded tip to project inwards.

Wings to the base of the toes; extreme tip of tail projecting.

The distribution of the fur upon the wing-membranes is very similar to that of *A. noveboracensis*; but the interfemoral membrane, though completely covered, is not clothed quite so densely behind as in that species. A very small patch of short white hairs occurs on the back of the forearm, near the elbow; this is not found in *A. noveboracensis*, and affords an easy method of distinguishing spe-

cimens of not quite adult *A. cinerea*, which resemble the former species closely. The concavity of the ear-conch and the tragus are clothed with soft hairs.

Above, on the back, black or very dark brown at the base, then half the hair is pale yellowish white, succeeded by a dark band, the extreme points white. Towards the head the upper black band becomes paler, and disappears almost altogether on the face; behind, the light yellow band becomes deeper in colour, passing into dark brown on the interfemoral membrane, the hairs still tipped with white.

Beneath, the fur under the neck wants the terminal black and white bands; these reappear on the chest, but the pale yellow band is narrower than on the back, and disappears altogether on the abdomen, being replaced by dark brown.

The lower incisors are all equal, trifid, and slightly crowded; the first upper premolar extremely minute, in the centre of the angle between the canine and second premolar.

Var. *a* (*Atalapha grayi*).

Lasiurus grayi, *Tomes, P. Z. S.* 1857, p. 40.
Atalapha grayi *et* pallescens, *Peters, MB. Akad. Berl.* 1870, p. 910.

This is the South-American form of *A. cinerea*, from which it differs only in the less convexity of the inner side of the ear-conch (Plate XVII. fig. 2), in being slightly smaller, and in the colour of the fur, the second band next the extremity of the hairs being reddish, not black or dark reddish brown as in *A. cinerea*. The wing-membranes extend to the base of the toes; and Mr. Tomes's statement that they "extend a little way beyond the extremity of the tibia, but do not reach halfway along the foot," has been founded on an imperfect examination of the types. In the dried specimen marked as the type the membranes have shrunk very much, and appear, in this condition, as if they were attached near the end of the tibia; when moistened, however, the true position of their attachment is shown. I do not think the differences described above are sufficient to separate this form from South America as a distinct species from *A. cinerea*. Allen has remarked that the bright red varieties of *A. noveboracensis* are found in the warmer latitudes of America, while the greyish chocolate and dark red varieties occur in the northern parts of the country. In the same manner *A. cinerea* appears to me to be represented in South America (whence the types of *A. grayi* have come) by a variety slightly smaller, and having the second brownish chocolate band replaced by bright reddish brown.

Length (of an adult ♀ of *A. cinerea* from California), head and body 2″·9, tail 2″·85, head 0″·8, ear 0″·7 × 0″·5, forearm 2″·1, thumb 0″·52, third finger 4″·2, fifth finger 2″·5, tibia 0″·9, calcaneum 0″·6, foot 0″·46.

Hab. North and South America, from Nova Scotia to Chili.

Distribution probably similar to that of *A. noveboracensis* and its varieties.

a. ad. sk.	North America.	J. Gould, Esq. [P.].
b. ♀ ad., al.	Monterey, California.	J. H. Gurney, Esq. [P.].
c. ♀ ad., al.	Nebraska.	Smithsonian Institute [P.].
d. ad. sk.	Malden, Canada.	P. W. Maclagan, Esq. [P.].
e,*f*. imm. sks.		
g. ♂ ad., al.		Lieut. Strickland [P.].
h. ad. sk.	Juan da Fuca.	Sir J. Richardson [P.].
i. skull of *h*.		
	Var. *a* (*Atalapha grayi*).	
j. ♂ ad., al.	Cuba.	W. S. Macleay, Esq. [P.].
k. imm. sk.	Bolivia.	Purchased.
l. ♀ ad., al.	Chili.	Purchased.
m. ♀ ad., al.	Chili. (Type of *Lasiurus grayi*, Tomes.)	
n. imm. sk.	Chili.	Purchased.
o. ad. sk.	No history.	Purchased.
p. ad. sk.		

Premolars $\frac{1-1}{2-2}$. Subgenus DASYPTERUS.

3. Atalapha intermedia.

Lasiurus intermedius, *Allen, Proc. Philad. Acad.* 1862, p. 146; *Monogr. of Bats of North Amer.* 1864, p. 25, figs. 21, 22.
Atalapha intermedia, *Peters, MB. Akad. Berl.* 1870, p. 912.

The muzzle is narrower and the head apparently less elevated than in either *A. cinerea* or *A. noveboracensis*; the nostrils are also not so widely separated, and, owing to the less development of the glandular prominences of the upper lip, project more. The ears are very differently shaped from those in either of these species; they are much longer than broad, and there is a distinct tip (Plate XVI. fig. 3). The inner margin commences in a large rounded lobe, the posterior part of which is narrow and rounded and projects backwards; about one third of the inner margin above the base is straight, then regularly and slightly convex to the tip. The outer margin is nearly straight from the tip to the terminal lobe, interrupted only by a slight but distinct emargination immediately beneath the tip; the terminal lobe commences opposite the front margin of the tragus, and projects considerably outwards, being much larger than in either *A. cinerea* or *A. noveboracensis*. The tragus is much broader in the upper third than in *A. cinerea*, more obtuse at the tip and less curved inwards.

Wings from the base of the toes; thumbs and feet moderate.

The fur of the body extends upon the membranes as in *A. cinerea*, but to a less extent. Scarcely more than half the upper surface of the interfemoral is covered. A narrow portion of the wing-membrane external to the legs is covered, and the short close fur reappears on the toes. Inferiorly a band of short fur passes outwards posterior to the forearm to the carpus.

Length, head and body 3″, tail 2″·5, ear 0″·7, tragus 0″·3, forearm 2″·1, thumb 0″·45, third finger 4″, fifth finger 2″·3, tibia 0″·9, foot 0″·4.

Hab. Texas; Mexico.

a. ♂ ad., al.	Texas.	Smithsonian Institute [P.].

4. Atalapha egregia.

Atalapha egregia, *Peters, MB. Akad. Berl.* 1870, p. 912.

Muzzle conical, and narrower than in the preceding species; end of nose prominent; glands on the sides of the muzzle between the eyes and nostrils forming rounded elevations not engaging the lip; ears rhomboidal, but longer than broad; upper third of the outer margin of the conch straight, middle slightly convex, deeply emarginate opposite the base of the tragus, terminating in a rather deep lobe, whereof the front margin is faintly concave; inner margin of the tragus straight, except immediately beneath the subacute tip which bends inwards, outer margin forming a strongly projecting angle nearly opposite the base of the inner margin.

Wings from the metatarsus, close to the base of the toes; a narnow but distinct postcalcaneal lobule; extremity of the tail not projecting.

Wing-membrane naked above, except a small patch of short hairs at the base of the thumb and near the elbow; beneath, a narrow band of fur extends outwards behind the forearm, and a few hairs appear in the angles between the fifth and fourth, and fourth and third fingers; the antebrachial membrane is covered with a few hairs only. The fur of the back extends rather thickly upon the wings as far as a line drawn from the middle of the humerus to the knee; behind, more than three fourths of the interfemoral is covered, also the legs and feet and the adjoining wing-membrane are clothed with short hair. Beneath, the wings are similarly clothed, but the base of the interfemoral, as far as the end of the second caudal vertebra, is alone covered.

Above, dark at the base of the hairs, then light buff, the extremities red; beneath, the basal half is dark brown, the terminal half brilliant red; the fur clothing the interfemoral membrane and the posterior extremities bright red throughout. Wing-membranes black, slightly paler along the thumb, the index and the middle fingers.

Length (of an adult ♂), head and body 2″·45, tail 2″·3, head 0″·8, ear 0″·7 × 0″·5, tragus 0″·35, forearm 1″·9, thumb 0″·48; third finger—metacarp. 2″·15, 1st ph. 0″·8, 2nd ph. 1″·1; fourth finger—metacarp. 1″·9, 1st ph. 0″·45, 2nd ph. 0″·6; fifth finger—metacarp. 1″·65, 1st ph. 0″·35, 2nd ph. 0″·4; tibia 0″·8, foot 0″·4.

Hab. Brazil (Sta. Catherina).

Type in the collection of the Berlin Museum.

This is the most brilliantly coloured species of the genus. It is

at once distinguished by the form of the tragus and the colour of the fur.

5. Atalapha ega.

Nycticejus ega, *Gervais, Expédition du Comte de Castelnau, Zoologie*, p. 73, pl. xiv. figs. 1, 1 *a*–1 *c* (1855).
Lasiurus caudatus *et* aga, *Tomes, P. Z. S.* 1857, pp. 42, 43.
Atalapha ega *et* caudata, *Peters, MB. Akad. Berl.* 1870, p. 914.

Head and muzzle as in *A. noveboracensis*; ears rhomboidal, the inner margin of the ear-conch very convex, outer margin straight or slightly concave immediately beneath the tip for nearly half its length, then convex, deeply emarginate opposite the base of the tragus, terminating near the angle of the mouth in a prominent rounded lobe; tragus as in *A. noveboracensis* but larger, the outer margin forming a strongly projecting angle opposite the base of the inner margin, thence convex upwards to the tip, which is subacute and directed forwards and inwards, inner margin concave upwards.

Wings from the base of the toes; a small but distinct postcalcaneal lobe; tail wholly included within the interfemoral membrane.

On the upper surface the fur extends almost as far outwards as a line drawn from the middle of the humerus to the knee, upon half the interfemoral, thinly upon the legs, and reappearing on the backs of the toes; beneath, the wing-membrane is covered as far as a line joining the elbow and the knee, and a broad band of fine thinly-spread hairs passes outwards behind the forearm to the carpus and to the angle between the third and the last finger.

Above, dark brown at the base, then buff, the extremities yellowish buff; beneath, similar but paler.

Lower incisors trifid, placed at right angles to the direction of the jaws; first lower premolar scarcely one third the size of the second premolar, which is flattened from before backwards.

Length, head and body about 2″·1, tail 2″, head 0″·6, ear 0″·6 × 0″·45, tragus 0″·32, forearm 1″·7, thumb 0″·35, third finger 3″·5, fifth finger 2″·2, tibia 0″·7, foot 0″·33.

Hab. Brazil (Pernambuco, Ega); Chili.

a. ad. sk.	Ega, Amazons.	H. W. Bates, Esq. [C.].
b. ad. sk.	Pernambuco.	J. P. G. Smith, Esq. [P.].
	(Type of *Lasiurus caudatus*, Tomes.)	
c. skull of *a*.		

11. HARPIOCEPHALUS.

Murina *et* Harpiocephalus, *Gray, Ann. & Mag. Nat. Hist.* x. p. 259 (1842).
Murina *et* Harpyiocephalus, *Gray, Ann. & Mag. Nat. Hist.* 3rd ser. xvii. p. 90 (1866).
Murina, *Dobson, P. A. S. B.* 1873, p. 109; *Ann. & Mag. Nat. Hist.* 1875, xvi. p. 349.
Harpiocephalus, *Dobson, Monogr. Asiat. Chiropt.* p. 150 (1876).

Muzzle elongated, conical; *nostrils prominent, tubular, produced beyond the upper lip*, opening laterally or sublaterally, emarginate between; crown of the head scarcely raised above the face-line; ears thin, generally covered with glandular papillæ; tragus long, attenuated towards the tip, and inclined outwards; thumb very large, with a large strongly curved claw; wings broad, from the base of the toes or attached along the outer toe as far as the base of the claw; interfemoral membrane very hairy, or half-covered above. Skull thick, not vaulted; coronoid process of the mandible much developed vertically.

Dentition. Inc. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Upper incisors on each side parallel, stout, and blunt; posterior upper molar small or consisting of a thin transverse lamina of bone, and sometimes absent in the adult.

The peculiarly shaped elongated tubular nostrils are at once characteristic of this genus. In no other genus of Bats, except *Harpyia* (*Pteropodidæ*) is this peculiar elongation of the nostril beyond the muzzle found. In the different species the form and direction of the nasal tubes vary within short limits, but the general characters are the same.

Harpiocephalus is evidently more closely allied to *Kerivoula* than to any other genus, and appears to occupy a position with regard to that genus similar to that occupied by *Vesperugo* with regard to *Vespertilio*.

Range. From the Himalayas to the Malay archipelago, inhabiting hill tracts.

Synopsis of the Subgenera and Species.

I. First upper premolar much smaller than the second ..... Subg. MURINA.
  a. Upper third of the outer margin of the ear-conch concave; forearm 1″·35 .... 1. *H. suillus*, p. 278.
  b. Upper third of the outer margin of the ear-conch convex or straight; forearm 1″·1 ..... 2. *H. auratus*, p. 279.
II. First upper premolar equal to or nearly equal to the second ..... Subg. HARPIOCEPHALUS.
  c. Upper third of the outer margin of the ear-conch concave.
    a'. Ears narrow, pointed; forearm 1″·3 .. 3. *H. griseus*, p. 280.
    b'. Ears broadly rounded off above; forearm 2″ ..... 4. *H. harpia*, p. 281.
  d. Upper third of the outer margin of the ear-conch convex or straight.
    c'. No spur near the base of the inner margin of the ear-conch; first upper premolar equal to the second; forearm 1″·3 ..... 5. *H. cyclotis*, p. 282.
    d'. A distinct horizontal spur-like projection near the base of the inner margin of the ear-conch; first upper premolar smaller than the second; forearm 1″·3. 6. *H. leucogaster*, p. 283.

1. Harpiocephalus suillus.

Vespertilio suillus, *Temminck, Monogr. Mammal.* ii. p. 224 (1839).
Vesperugo suillus, *Wagner, Suppl. Schreb. Säugeth.* v. p. 741.
Harpiocephalus suillus, *Dobson, Monogr. Asiat. Chiropt.* p. 152 (1876).

Muzzle narrow, elongated; nostrils very prominent, consisting of two diverging tubes with an emargination between, opening laterally; viewed from below, the projecting nostrils resemble in shape a small hour-glass placed horizontally at the extremity of the muzzle. Ears moderate, shorter than the head, rounded off at the tips; the upper third of the outer margin angularly emarginate as in *Vespertilio emarginatus*, the middle third commencing by a very abrupt convexity, then slightly concave opposite the middle of the tragus, and terminating in a convex lobe slightly in front of the base of the tragus. Tragus moderately long, attenuated above and slightly curved outwards; a small pointed lobule at the base of the outer margin, succeeded by a slight emargination, immediately above which the tragus attains its greatest width; inner margin slightly convex from the base upwards; outer margin straight below, upper half concave, causing the extremity to incline outwards; tip subacutely pointed.

Wings from the sides of the outer toes, extending almost as far as the claws; extreme tip of the tail projecting; calcanea distinct, extending halfway between the ankle-joint and the extremity of the tail, ending abruptly.

The long fur ends in front between the eyes; but the face is clothed with short fur, which leaves the tubular nostrils alone naked. The wing-membranes on the upper surface are covered as far as a line drawn from the middle of the humerus to the knee-joint; the interfemoral membrane is naked, except at the base between the thighs. Beneath, the membranes are even less covered than on the upper surface. Fur moderately long; above light greyish brown, the extremities dark brown; beneath light greyish brown throughout.

The upper incisors on each side are nearly equal in size, stout, and obtusely pointed, lying close together by their whole length, the base of the outer incisor close to the canine; the outer incisor is, if any thing, longer, with a distinct cingulum, from which a small blunt cusp projects outwards and touches the canine. The first premolar is small, scarcely one third the bulk of the second premolar, which very nearly equals the canine in vertical extent, and exceeds it considerably in cross section; the last molar is a simple transverse plate. In the lower jaw the incisors are trifid and slightly crowded, those next the canines longest; the canines are very short; the first and second premolars are shorter than the canine, and the first premolar is slightly less than the second in vertical extent.

Length, head and body 2″, tail 1″·3, head 0″·7, ear 0″·53, tragus

0″·3, forearm 1″·35, third finger 2″·45, fifth finger 1″·9, thumb 0″·35, tibia 0″·65, calcaneum 0″·45, foot 0″·3.

Hab. Malayan Archipelago (Sumatra, Java, Flores).

a. ad. sk.	Flores.	A. R. Wallace, Esq. [C.].

2. Harpiocephalus auratus.

Murina aurata, *Alph. Milne-Edwards, Mammif. du Tibet*, p. 250, pl. xxxvii[b]. fig. 1, and pl. xxxvii[c]. fig. 2 (1872).
Harpiocephalus auratus, *Dobson, Monogr. Asiat. Chiropt.* p. 153 (1876).

Head and muzzle as in *H. suillus*; but the nostrils are differently shaped. Each nostril forms a distinct tube directed sublaterally, with a circular aperture marked by a very small notch on the outer and upper margin. The central part of the upper lip is cut off by a small but distinct groove beneath each nostril, the centre is concave, the sides project and support the base of the nasal tube on each side. Ears small, almost regularly oval; the inner margin of the conch evenly convex, the outer margin similarly convex in the upper two thirds, the lower third slightly flattened opposite the base of the tragus, and terminating in a small but very distinct rounded lobe. Tragus very acutely pointed, tapering, slightly curved outwards; lower fourth of outer margin straight, sloping slightly outwards, with a rounded projection opposite the base of the inner margin, and a second point slightly higher up, where the tragus attains its greatest breadth (Plate XVII. fig. 1, ear, enlarged 2½).

Thumb very long, armed with a large strong claw. Wings to the base of the claws. Interfemoral membrane large; last caudal vertebra and half antepenultimate vertebra free.

The whole body is thickly covered with hair; both surfaces of the ear-conch are clothed, the inner surface less densely; the fur on the muzzle is short; but the short fur extends almost to the ends of the nasal tubes, and between them a few hairs pass down to the lip. Upon the wing-membrane the fur is thin but long, extending as far as a line drawn from the elbow to a point on the free margin of the membrane nearly half an inch from the ankle; the back of the forearm, as far as the base of the claw of the thumb, is covered with short golden-yellow fur, which also extends upon the third finger as far as the end of its second phalanx, and upon half the metacarpal bone of the fifth finger; the interfemoral membrane is covered with very long hair, which forms a dense fringe along its free margin, extending also upon the legs and backs of the feet, and projecting beyond the extremities of the toes. Beneath, the wing-membrane is covered as far as a line drawn from the elbow to the knee; and the whole interfemoral membrane is clothed with short bright silvery hairs.

Fur on the upper surface black, with bright golden-yellow extremities, more distinct in the middle of the back; beneath black, the extremities of the hairs silvery white, the white being most conspicuous beneath the lower jaw and upon the neck and pubis.

Outer upper incisors considerably larger than the inner ones. First upper premolar much smaller than the second, but not minute; second premolar long and pointed, exceeding the canine both in cross section and in vertical aspect; last molar a narrow transverse lamina. Lower incisors small, equal, and trilobate. Lower canine scarcely exceeding the first premolar in vertical extent; second premolar not equal to the first molar vertically.

Length (of an adult ♂ preserved in alcohol), head and body 1″·4, tail 1″·2, head 0″·6, ear 0″·45 × 0″·3, tragus 0″·26, forearm 1″·1, thumb 0″·35, third finger 2″, fifth finger 1″·6, tibia 0″·5, foot 0″·26, calcaneum 0″·45.

Hab. Thibet. Type in the collection of the Paris Museum.

This very interesting species, which possesses the dentition of one section of the genus and the form of ears peculiar to the other, has been well described by M. Alphonse Milne-Edwards; and the description is accompanied by an excellent plate. There is nothing more striking than the form of the nostrils, which are quite different from those of any other species of Bat.

3. Harpiocephalus griseus.

Murina grisea (*Hutton*), *Peters, P. Z. S.* 1872, p. 711; *id. MB. Akad. Berl.* 1872, p. 258.

Harpiocephalus griseus, *Dobson, Monogr. Asiat. Chiropt.* p. 154 (1876)*.

Head and muzzle as in *H. suillus*. Ears small, narrow, and pointed, the tip narrowly rounded off; outer margin of the conch as in *H. suillus*, the upper third angularly emarginate, the middle third abruptly convex, the lower third straight, ending opposite the base of the tragus; tragus acutely pointed, moderately long and slightly curved outwards.

Thumb long, with a strong claw; the last (small) vertebra of the tail free; wings from the base of the toes.

The interfemoral membrane is densely covered above with rather long hair, which, however, thins out towards the posterior margin; and a few rather short fine hairs only appear upon the feet.

Fur, above, dark brown with yellowish-brown extremities; beneath, similar, but the extreme points of the hairs are ashy.

Upper incisors large, with acute summits, almost equal to the canine in vertical extent; inner incisors somewhat larger than the outer, with a second, blunt, posterior cusp arising from the cingulum; upper premolars equal to each other and also to the canines in vertical extent; the second premolar slightly exceeds the first in the antero-posterior diameter of its base; last upper molar nearly equal to half the antepenultimate molar. The vertical cusp of the lower

* Capt. Hutton's remarks on the habits of *H. leucogaster* were appended to the description of this species in my 'Monograph of the Asiatic Chiroptera.' This mistake arose from transposition of one of the sheets of the MS. when in the printer's hands, and the error was not perceived by me in time to make the necessary correction.

canine is very short, scarcely exceeding the blunt cusp of the cingulum projecting in front; lower premolars equal, thick and blunt, larger than the canines, but not equal in vertical extent to the anterior cusp of the first molar.

Length, head and body 1″·4, tail 1″·1, ear 0″·45 × 0″·3, tragus 0″·26, forearm 1″·3, thumb 0″·35, third finger 2″·4, fifth finger 1″·8, tibia 0″·45, calcaneum 0″·45, foot 0″·33.

Hab. Jeripanee, N.W. Himalaya; elevation 5500 feet. Type in the Museum of the E. I. Comp. at South Kensington.

4. Harpiocephalus harpia.

Vespertilio harpia, *Temminck, Monogr. Mammal.* ii. p. 219, pl. 55 (1839).
Vesperugo harpia, *Keys. & Blas. Wiegm Archiv,* vi. (1840) p. 2; *Wagner, Suppl. Schreb. Säugeth.* v. p. 740 (1855).
Harpiocephalus rufus, *Gray, Ann. & Mag. Nat. Hist.* x. p. 259 (1842).
Noctulinia lasyura, *Hodgson, J. A. S. B.* 1847, p. 896.
Lasiurus pearsonii, *Horsfield, Cat. Mamm. Mus. E.-Ind. Co.* p. 36 (1851); *Blyth, J. A. S. B.* xx. p. 524; *Jerdon, Mamm. of India,* p. 40 (1867).
Vespertilio pearsonii, *Tomes, P. Z. S.* 1858, p. 87; *Blyth, Cat. Mamm. Mus. A. S. Beng.* 1873, p. 109.
Murina harpia, *Dobson, P. A. S. B.* 1873, p. 109.
Harpiocephalus harpia, *Dobson, Monogr. Asiat. Chiropt.* p. 155, figs. *a*, *b*, *c* (skull) (1876).

Muzzle rather short, obtusely conical; end of nose projecting considerably beyond the lip, consisting of diverging tubular nostrils opening laterally with a slight emargination between as in *H. suillus*; ear-conch nearly as broad as long, broadly rounded at the tip; outer side flatly emarginate beneath the tip, then slightly convex, again emarginate opposite the base of the inner margin, terminating in a small lobe at a short distance in front of the base of the tragus; inner margin very convex forwards about the junction of its lower and middle thirds, slightly convex and almost horizontal in upper two thirds; tragus with a very small lobe at base of outer margin, attaining its greatest width opposite the base of the inner margin, thence narrowing towards the tip, which is subacutely pointed; inner margin straight or very slightly convex, outer convex below, slightly concave above (Plate XVII. fig. 2).

Thumb long, the distal phalanx very long, armed with a large claw. Terminal phalanges of fourth and fifth fingers bifid at their extremities. Wings from the base of the toes.

The face is very thinly covered with hair; the inner side of the ear-conch is thinly clothed with very short fine hair. On the wing-membrane the fur extends somewhat beyond a line drawn from the middle of the humerus to the outer toe when the limbs are extended as in flight; the whole of the upper surface of the interfemoral membrane is clothed with long thinly spread hairs, which also cover the legs and the wing-membrane for a short distance beyond, extending also more densely upon the calcanea and backs of the feet,

and projecting beyond the toes. The backs of the forearms are covered with a few short hairs. Beneath, the wing-membrane is covered with fine hairs as far as a line drawn from the elbow to the knee-joint; the interfemoral has a few very short hairs, chiefly along the tail.

Outer upper incisor shorter than the inner one, and wedged in between it and the canine; upper premolars well developed and nearly equal; posterior or third molar small, deciduous, less than one quarter the size of the second molar, and generally absent in adult animals; third lower molar much smaller than the second, but elevated slightly above it by its position on the root of the ascending ramus of the jaw.

Length (of an adult ♀ preserved in alcohol), head and body 2″·5, tail 2″, head 0″·95, ear 0″·7 × 0″·5, tragus 0″·4, forearm 2″, thumb 0″·6, third finger 3″·8, fifth finger 3″, tibia 0″·85, calcaneum 0″·7, foot 0″·4.

Hab. Himalaya (Darjiling; Khasia hills); Sumatra; Java; Amboina. Type in the collection of the Leyden Museum.

(For description of the skull and dentition of this species, and remarks on its food &c., see 'Monograph of the Asiatic Chiroptera' referred to above.)

a. ♀ ad., al.	Malabar coast.	Purchased.
b. ad. sk.	Amboina.	Purchased.

5. Harpiocephalus cyclotis.

Murina cyclotis, *Dobson, P. A. S. B.* Dec. 1872, p. 210; *J. A. S. B.* 1873, pt. ii. p. 206, pl. xiv.

Harpiocephalus cyclotis, *Dobson, Monogr. Asiat. Chiropt.* p. 158, figs. *a*, *b*, *c* (skull) (1876).

Muzzle and nostrils as in *H. harpia*, Temm. The ears are nearly as wide as long, and almost quite circular—the only interruption to the regular convexity of the external margin being a very faint flattening of the upper and outer portion, and a slight convexity opposite the base of the tragus (Plate XVII. fig. 3, head, enlarged). The tragus is shaped like that of *H. suillus*, but is considerably longer, and tapers to a much finer point.

Wing-membrane attached along the whole length of the outer toe to the base of the claw; feet small, toes of nearly equal length; extreme tip of tail alone free.

The upper surface of the interfemoral membrane is covered with hair, which is most dense at the root of the tail, along the tibiæ, and on the calcanea; it also extends across the tibia to the wing-membrane. The backs of the feet are thickly covered with hair which exceeds the toes in length.

On the upper surface the fur is bicoloured, dark brown at the base, with bright ferruginous tips; beneath paler brown throughout.

The upper incisors are long and slender; the outer incisor is shorter than the inner, and almost touches the canine at its base, but is widely separated from it at its extremity; at the outer side

of its base a small cusp projects outwards, as in *H. suillus*. The first premolar is scarcely equal to half the canine in vertical extent, but is nearly equal to the second premolar; the second molar is equal to the first; but the third is very narrow, forming a simple bony lamina as wide as the preceding molar, but less than half its antero-posterior diameter. In the lower jaw the last molar is smaller than the preceding one, but possesses the same number of cusps; the other molars and premolars present about the same relative proportions as in the upper jaw.

On the whole the teeth are similar to those in *H. harpia*, agreeing in this respect with *H. griseus* and *H. leucogaster*, but differing remarkably from *H. suillus* and *H. auratus*, in which the first upper premolar is much smaller than the second, which equals the canine in vertical extent.

Length, head and body 1″·7, tail 1″·5, head 0″·7, ear 0″·6, tragus 0″·35, forearm 1″·3; thumb—metacarp. 0″·1, ph. 0″·2; third finger—metacarp. 1″·2, 1st ph. 0″·55, 2nd ph. 0″·7; fifth finger—metacarp. 1″·25, 1st ph. 0″·4, 2nd ph. 0″·35; tibia 0″·6, calcaneum 0″·5, foot 0″·3.

Hab. Himalaya (Darjiling); Ceylon. Type in the Indian Museum, Calcutta.

(For description and figure of the skull of this species, see 'Monograph Asiat. Chiroptera' referred to above.)

a. ♀ imm., al. Ceylon. Purchased.

6. Harpiocephalus leucogaster.

Murina leucogaster, *Alph. Milne-Edwards, Nouv. Arch. Mus.* vii. *Bull.* p. 91 (1871); *Mammif. du Tibet*, p. 250, pl. xxxvii[b]. fig. 2, pl. xxxvii[c]. fig. 3 (1872).

Harpyiocephalus huttonii, *Peters, MB. Akad. Berl.* 1872, p. 257; *P. Z. S.* 1872, p. 711.

Harpiocephalus leucogaster, *Dobson, Monogr. Asiat. Chiropt.* p. 157 (1876).

Head, muzzle, and nostrils as in *H. cyclotis*; ears also very similar but larger, and near the base of the inner side of the ear-conch, opposite the posterior angle of the eye, a small but distinct spur-like process projects abruptly forwards from the convex margin (Plate XVII. fig. 4, head, enlarged).

Fur long and dense. Above brown, greyish at the base; beneath, the throat, chest, and abdomen are whitish, the sides of the body light brown. Distribution of the fur as in *H. cyclotis*.

Outer upper incisors longer than the inner ones; first upper premolar about three fourths the size of the second premolar, and in a plane slightly internal to the canine and second premolar; other teeth as in *H. cyclotis*.

This species resembles *H. cyclotis* in size, in the general form of the ears, and in the distribution of the fur. It is easily distinguished, however, by the presence of the small projecting tooth on the inner margin of the ear-conch, near its base, by the relatively small size of the first upper premolar, and by the colour of the fur, which,

though by no means a reliable character in Chiroptera, appears to be quite constant in these species, the bright ferruginous red fur of *H. cyclotis* contrasting strongly with the plain brown fur of *H. leucogaster*.

Length, head and body 1″·9, tail 1″·5, head 0″·75, ear 0″·7, tragus 0″·35, forearm 1″·3, thumb 0″·35, third finger 2″·5, fifth finger 1″·9, tibia 0″·6, foot 0″·3.

Hab. North-western Himalaya; Thibet.

Type in the collection of the Paris Museum.

a. ♂ ad., al. Thibet. G. E. Dobson, M.B. [E.].

12. VESPERTILIO.

Vespertilio, *Keys. & Blas. Wiegm. Archiv*, 1839, p. 306; *Fauna Deutschl.* p. 78 (1857); *Dobson, Monogr. Asiat. Chiropt.* p. 126 (1876).

Muzzle long; glandular prominences between the nostrils and eyes small, scarcely increasing the width of the face; nostrils opening sublaterally by simple crescentic apertures, crown of the head vaulted, slightly elevated above the face-line; ears separate, oval, longer than broad, generally equalling at least, often exceeding, the length of the head; *the internal basal lobe angular*, the external margin of the ear-conch terminating opposite the base of the tragus or very slightly in front of it; tragus long, generally acute, and attenuated upwards.

Tail less than (or very rarely equal to) the length of the head and body; postcalcaneal lobe absent or very small. Face hairy.

Incisors $\frac{2-2}{6}$; the upper incisors nearly equal, in pairs on either side close to the canines; the cusp of the outer incisor directed vertically downwards or curved slightly outwards, that of the inner incisor directed slightly forwards and inwards, so that these teeth appear to diverge from each other; lower outer incisors much larger than the inner incisors; premolars $\frac{3-3}{3-3}$, the first and second upper premolars very small, the second always smaller than the first, often minute and more or less internal to the tooth-row; the first and second lower premolars smaller than the third, the second considerably smaller than the first; molars $\frac{3-3}{3-3}$, the last upper molar rather less than half the antepenultimate molar.

Range. Temperate and tropical regions of both hemispheres.

This genus, which has probably the widest distribution among the genera of Chiroptera, is easily recognised by the large number of teeth and the peculiar character of the incisors, wherein all the species agree and differ from those of the nearly allied genus *Kerivoula*. The long and narrow muzzle thickly covered with hair, the simple crescentic nasal apertures, the oval elongated ear and narrow attenuated tragus, the slender and rather long extremities, the thin, almost naked, membranes, the peculiar dentition referred to above, and the quality and distribution of the fur are characters in which most of the species agree together, while the few points in

which they differ are so slight that it is very difficult to write in few words a description by which it may be possible to recognise with certainty a given species.

Most of the species appear to be dwellers in woods, some (of the subgenus *Leuconoë* especially) either habitually or occasionally live in caves or under the roofs of houses. The position of attachment of the wings to the hinder extremities and the size of the foot appear to be connected with the nature of their dwelling-places, the inhabitants of caves having larger feet more or less free from the membranes, while those living in woods have much smaller feet inclosed in the wing-membrane to the base of the toes.

Compared with the species of *Vesperugo*, these Bats, as might be expected from their more delicate organization, extend to a much less degree into the colder latitudes, and in countries where the species of both genera hibernate they leave their sleeping-places at a much later period in the year.

Synopsis of the Species.

I. Feet very large; wing-membrane from the tibia or ankle, rarely from the side of the foot; interfemoral membrane forming a very acute angle in the centre of its free margin behind; tail projecting by the last vertebra or by the last two vertebræ from the membrane; calcaneum very long, extending at least three fourths the distance between the ankle and the tail ..... Subgen. LEUCONOË.

a. Wings from the sides of the back near the spine.

a'. Wings from the middle of the tibiæ; the second lower premolar minute, quite internal to the tooth-row.

α. Tragus short, straight, and obtusely pointed; fur long; forearm 2″·1 .. 1. *V. pilosus*, p. 289.

b'. Wings from the ankles; the second lower premolar in the tooth-row.

β. Tragus moderately long, subacute; fur very short; forearm 1″·8 ..... 2. *V. macrotarsus*, [p. 290.

b. Wings from the sides of the body.

c'. Wings from the ankles.

c''. The second lower premolar minute, quite internal to the tooth-row.

γ. Tragus straight; fur very short; forearm 1″·6 ..... 3. *V. hasseltii*, p. 291.

d''. The second lower premolar stands in the tooth-row, or, partially only, internal.

c'''. The second upper premolar quite internal to the tooth-row.

δ. Tragus straight; fur moderately long; forearm 1″·55 ..... 4. *V. adversus*, [p. 292.

d'''. The second upper premolar stands in the tooth-row, or, with the first premolar, is drawn partially inwards.

ε. Tragus inclined outwards above, inner margin convex; forearm 1″·45 .... 5. *V. capaccinii*, [p. 293.

ζ. Tragus straight, inner margin straight; forearm 1″·45 ..... 6. *V. longipes*, p. 294.

η. Tragus inclined inwards, obtuse, inner margin slightly concave; forearm 1″·8 ..... 7. *V. dasycneme*, [p. 295.

d'. Wings from the tarsi.

e‴. The first and second upper premolars internal to the tooth-row, the third premolar separated by a narrow space from the canine.

θ. Tragus straight, subacute; forearm 1″·8. 8. *V. ferrugineus*, [p. 296.

e'. Wings from the metatarsi.

e''. The second lower premolar stands in the tooth-row or is partially drawn inwards.

f‴. The second upper premolar stands in the tooth-row, or, with the first, is partially drawn inwards.

ι. The ear laid forwards does not extend beyond the end of the muzzle; forearm 1″·45 ..... 9. *V. daubentonii*, [p. 297.

κ. The ear laid forwards extends one tenth of an inch beyond the end of muzzle; forearm 1″·45 ..... 10. *V. megalopus*, [p. 298.

g‴. The second upper premolar internal to the tooth-row.

λ. The ear laid forwards does not extend beyond the end of the muzzle; tragus inclined outwards; forearm 1″·5 ..... 11. *V. fimbriatus*, [p. 298.

f'. Wings from the base of the toes*.

f''. The second premolar in both jaws internal to the tooth-row.

h‴. The ear laid forwards extends exactly to the end of the muzzle.

μ. Fur moderately long; last two caudal vertebræ projecting; forearm 1″·25 12. *V. davidii*, p. 300.

ν. Fur very short; the last osseous caudal vertebra alone projecting; forearm 1″·35 ..... 13. *V. bocagii*, p. 300.

II. Feet moderate; wing-membrane from the base of the toes, rarely from the metatarsus; interfemoral membrane forming an obtuse angle in the centre of its free margin behind; tail wholly contained in the membrane or projecting by its extreme tip only; calcaneum extending about halfway between the ankle and the tail ..... Subg. VESPERTILIO.

A. *Old-World Species*†.

a. Tragus attenuated above, acutely pointed, and curved outwards.

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* The two species contained in this section would, perhaps, be more correctly classed with those of the next section, where they should occupy a place next *V. mystacinus*, to which they are closely related; but the comparatively large size of the feet and projecting caudal vertebræ render their position here necessary in order to fall in with the general plan of arrangement of the species.

† This division is made only for convenience, as, owing to the large number

a'. Wings from the metatarsus; fur of the neck and shoulders much longer than that of the rest of the body.
a. Ears nearly as long as the head; the outer margin of the ear-conch deeply concave above; terminal third of the hairs beneath pale brown; forearm 1″·5 ..... 14. *V. goudotii*, p. 301.
b'. Wings from the base of the toes; fur of the neck and shoulders scarcely longer than that of the rest of the body.
b''. Ears shorter than the head.
β. Ears much shorter than the head; outer side of the ear-conch deeply concave above; terminal half of the hairs beneath pure white; forearm 1″·35 ..... [p. 302. 15. *V. nipalensis*,
γ. Ears much shorter than the head; outer side of the ear-conch slightly concave above; terminal third of the hairs beneath pale reddish brown; forearm 1″·9 ..... 17. *V. tricolor*, p. 305.
δ. Ears nearly as long as the head; outer side of the ear-conch deeply angularly emarginate above; terminal third of the hairs beneath pale reddish brown; forearm 1″·58 ..... [p. 303. 16. *V. emarginatus*,
c''. Ears as long or longer than the head; outer side of the ear-conch flatly emarginate above.
c'''. Ears as long as the head.
ε. Forearm 1″·5 ..... 18. *V. oreias*, p. 305.
d'''. Ears longer than the head.
*d*⁴. Posterior margin of the interfemoral membrane fringed; tail as long as the head and body.
ζ. Wing-membranes variegated with orange and black; forearm 2″·05 ..... [p. 306. 19. *V. welwitschii*,
η. Wing-membranes unicoloured; forearm 1″·45 ..... 20. *V. nattereri*, p. 307.
*e*⁴. Posterior margin of the interfemoral membrane naked; tail shorter than the head and body.
θ. Wing-membranes unicoloured; forearm 1″·55 ..... [p. 308. 21. *V. bechsteinii*,
b. Tragus straight*, subacutely or obtusely pointed.
b'. Wings from the base of the toes.
b''. Outer side of the ear-conch flatly emarginate above.
b'''. Wing-membranes unicoloured.

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of species, and the slight leading differences observable among them, it is extremely difficult to arrange them all in a single synoptical table.

* Curved outwards above in *V. australis* only, *vide* p. 317.

b^4. Terminal half of the hairs beneath white.
ι. Ears longer than the head; forearm 2″·35 ..... 22. *V. murinus*, p. 309.
κ. Ears shorter than the head; forearm 2″·2 ..... 23. *V. africanus*, [p. 310.
c^4. Hairs black or dark brown beneath, the extreme tips greyish.
λ. Ears broad, slightly shorter than the head; forearm 2″·1 ..... 24. *V. murinoides*, [p. 310.
μ. Ears narrow, much shorter than the head; forearm 2″·5 ..... 25. *V. chinensis*, [p. 311.
c'''. Wing-membranes variegated with orange and black.
ν. Ears slightly shorter than the head; forearm 1″·9 ..... 26. *V. formosus*, [p. 311.
c''. Outer side of the ear deeply concave above.
d'''. Second upper premolar quite internal to the tooth-row.
ξ. Ears shorter than the head; lower two thirds of the outer margin of the ear-conch strongly and abruptly convex; forearm 1″·4. 27. *V. insularum*, [p. 313.
e'''. Second upper premolar in the tooth-row, or with the first premolar drawn partially inwards.
e^4. No postcalcaneal lobule.
ο. Ears shorter than the head; outer margin of the ear-conch slightly convex in the lower half; forearm 1″·5 ..... 28. *V. montivagus*, [p. 313.
π. Ears as long as the head; outer margin of the ear-conch strongly convex in lower half; forearm 1″·25 ..... 29. *V. mystacinus*, [p. 314.
f^4. Postcalcaneal lobe distinct; muzzle obtuse.
ρ. Tragus straight or slightly inclined inwards; fur long; forearm 1″·25 ..... 30. *V. muricola*, [p. 316.
σ. Tragus inclined outwards above; fur short; forearm 1″·55..... 31. *V. australis*, p. 317.

B. *New-World Species.*
a. Feet small; tail wholly included in the interfemoral membrane or the extreme tip alone projecting.
a'. Ears as long as the head; muzzle slender, pointed; thumb shorter than the foot .. 32. *V. nitidus*, p. 318.
b'. Ears shorter than the head; muzzle obtuse; thumb moderate, as long as the foot; forearm 1″·35..... 33. *V. nigricans*, [p. 319.
c'. Ears as long as the head; muzzle obtuse; thumb longer than the foot; face very hairy; forearm 1″·6 ..... 34. *V. oxyotus*, p. 320.

b. Feet rather large; last rudimentary caudal vertebra free.
a'. Fur very dense and woolly, covering the whole muzzle. Ears shorter than the head; forearm 1″·55 ..... 35. *V. polythrix*, [p. 321.
b'. Fur straight, moderately dense, not extending thickly upon the muzzle.
a''. Ears as long as the head; tragus straight; a small postcalcaneal lobule; posterior margin of the interfemoral naked; forearm 1″·45 ..... 36. *V. chiloensis*, [p. 322.
b''. Ears longer than the head; tragus inclined outwards; no postcalcaneal lobule; posterior margin of the interfemoral fringed; forearm 1″·5 ..... 37. *V. levis*, p. 323.
c. Feet rather large; last osseous caudal vertebra free or half free.
a'. Tragus long, inclined outwards.
c''. Wings from the base of the toes.
c'''. Ears longer than the head.
α. The extremity of the ear laid forwards extends about 0″·35 beyond the end of the muzzle..... 38. *V. evotis*, p. 324.
β. The extremity of the ear extends 0″·1 beyond the end of the muzzle ..... 39. *V. subulatus*, [p. 324.
d''. Wings from the tarsus or metatarsus.
d'''. Ears as long as the head.
γ. The extremity of the ear laid forwards extends to the end of the muzzle ..... 40. *V. carolii*, p. 325.
b'. Tragus moderately long, straight.
e''. Wings from the metatarsus or base of the toes.
e'''. Ears shorter than the head.
δ. The extremity of the ear laid forwards does not extend so far as the end of the muzzle.
δ'. The first and second upper premolars internal to the tooth-row; forearm 1″·75..... 41. *V. albescens*, p. 326.
ε'. The first and second premolars in the tooth-row; forearm 1″·35 42. *V. arsinoë*, p. 328.
ε. The extremity of the ear laid forwards extends to the end of the muzzle; forearm 1″·4 ..... 43. *V. lucifugus*, [p. 328.

Subgenus LEUCONOË.

1. Vespertilio pilosus.

Vespertilio (Leuconoë) pilosus, *Peters, MB. Akad. Berlin*, 1869, p. 403.

Ears long, narrow, and shortly rounded off above; inner margin of the ear-conch straight above and below, concave in the middle, outer margin straight, slightly concave opposite the base of the tragus, and terminating in a short rounded lobe; tragus rather

short and straight, obtusely pointed, inner margin straight, outer margin convex in lower three fourths, straight above.

Wings from the middle of the tibiæ, *and from the sides of the back almost as close to the spine* as in *V. macrotarsus* from the Philippine Islands. Interfemoral membrane triangular behind, last caudal vertebra free; calcaneum weak, concave behind.

Feet remarkably large, proportionally larger than in any other known species of the genus; the outer toe much shorter than the others.

Fur long and dense, extending thinly upon the upper surface of the interfemoral membrane as far as the end of the fourth caudal vertebra, and upon the legs to the ankles. Above, dark brown, with paler extremities; beneath, a lighter shade of the same colour.

First and second upper premolars minute, internal to the tooth-row, but distinctly visible from without, the second very much smaller than the first; second lower premolar very small and quite internal, in the angle between the closely approximated first and third premolar.

Length (of the type specimen, an adult ♀), head and body 2″·4, tail 1″·9, ear 0″·8, tragus 0″·3, forearm 2″·1, thumb 0″·45, third finger 3″·5, fifth finger 2″·8, tibia 0″·8, foot 0″·7.

Hab. South America (Montevideo).

Type in the collection of the Paris Museum.

2. Vespertilio macrotarsus.

Vespertilio macrotarsus, *Waterhouse, Ann. & Mag. Nat. Hist.* vol. xvi. p. 51 (1845); *Wagner, Suppl. Schreb. Säugeth.* v. p. 740 (1855); *Dobson, Monogr. Asiat. Chiropt.* p. 130 (1876).

Ears slightly longer than the head: laid forwards their extremities extend exactly to the end of the nose; inner margin of the conch straight in the lower ascending portion for about one third its length, then regularly convex, with a slight flattening in the upper third; the outer margin forms a straight line without interruption as far as a point opposite the base of the tragus, terminating in a small lobe opposite the base of the inner margin. Tragus straight and very acutely pointed; inner margin straight; lobe at base of outer margin small, succeeded by an emargination, above which the tragus reaches its greatest width (Plate XVIII. fig. 1, ear, enlarged).

Wings to the ankles; feet very large, the claws of an intensely black colour, contrasting with the prevailing light brownish hue of the integuments. Calcaneum very long, extending to within a very short distance of the tail. The wing-membranes are *attached to the sides of the back* at a distance of about a quarter of an inch from the spine on each side; and the surface covered by hairs across the loins is scarcely more than half an inch in width.

Fur above dark brown, with paler tips; beneath, canary-colour, the bases of the hairs dark. The fur is everywhere very short, and scarcely extends to either the wing- or interfemoral membrane.

Dentition as in *V. capaccinii*. The second lower premolar scarcely more than half the height and less than one third the size of the first premolar.

This species is at once distinguished by the attachment of the wing-membranes and by the intensely black colour of the claws.

Length (of the type specimen, an adult ♀, preserved in alcohol), head and body 2″·2, tail 2″·1, head 0″·75, ear 0″·78, tragus 0″·35, forearm 1″·8, thumb 0″·35, third finger 3″·6, fifth finger 2″·4, tibia 0″·7, calcaneum 0″·9, foot 0″·55.

Hab. Philippine Islands.

a. ♀ ad., al. (type). Philippine Islands. Zool. Soc. Collection.

3. Vespertilio hasseltii.

Vespertilio hasseltii, *Temm. Monogr. Mammal.* ii. p. 225 (1835–41); *Peters, MB. Akad. Berl.* 1866, p. 18; *Dobson, Monogr. Asiat. Chiropt.* p. 126 (1876).

Vesperugo hasseltii, *Wagner, Suppl. Schreb. Säugeth.* i. p. 512 (1840), v. p. 740 (1855).

Trilatitus hasseltii, *Gray, Ann. & Mag. Nat. Hist.* x. p. 258 (1842).

Ears shorter than the head, and rather narrow; laid forwards the extremities reach very little further than half the distance between the eye and the end of the nose; they are shaped almost precisely similar to those of *V. macrotarsus*; the tips are broadly rounded, the outer margin forms a straight line from the tip to a point opposite the base of the tragus, where it is interrupted by a fold of the conch passing outwards to form the posterior margin of the small lobe, in which the outer margin of the ear ends slightly in front of the inner margin (Plate XVIII. fig. 5, ear, enlarged). Tragus moderately long, narrow, and tapering to an acute point; the inner margin straight, the outer slightly convex, with a triangular lobe at the base; it is not so much attenuated towards the tip nor so acutely pointed as in *V. macrotarsus*.

Wings from the ankles; feet very long and slender; interfemoral membrane large, acutely angular behind. Fur *very short* above and beneath; the muzzle in front of the eyes almost naked. The fur of the body scarcely extends upon the wing-membranes, except at their origin from the sides of the body; upon the interfemoral it extends slightly further back than a line drawn between the knee-joints. Beneath, the fur extends upon the wing-membrane as far as a line drawn from the elbow-joint to the commencement of the distal third of the femur; upon the interfemoral its extent is similar to that on the upper surface, but about half the surface of the membrane is covered thinly with minute hairs; tibia and feet (except at base of claws) quite naked on both surfaces.

Fur, above, dark at the base, with brown tips; beneath, dark brown or black, with white extremities.

The second premolar *in both jaws* is extremely small, and with difficulty seen even with a lens; it is placed in the angle between

the first and third premolars, and in vertical extent does not equal the cingulum of either tooth; the lower incisors are slightly crowded.

Length (of an adult ♀ preserved in alcohol), head and body 2″·1, tail 1″·8, head 0″·65, ear 0″·6, tragus 0″·25, forearm 1″·6, third finger 2″·6, fifth finger 2″, tibia 0″·65, foot 0″·45.

This species, as Dr. Peters has remarked, was long considered to belong to the genus *Vesperugo*, the extremely small second premolar in both jaws having escaped notice. Although the second *upper* premolar is very small in every species of *Vespertilio*, and in some quite internal, yet in no other species is the second lower premolar quite internal, placed in the angle between the closely approximated first and third premolars, and not sufficiently large to fill that angle.

Hab. Malay peninsula; Siam; Sumatra; Java.

a. ad. sk.	Java.	Purchased.
b. ♀ ad., al.	Burma.	Secretary of State for India [P.].

4. Vespertilio adversus.

Vespertilio adversus, *Horsfield, Zoological Researches in Java* (1824); *Dobson, Monogr. Asiat. Chiropt.* p. 128 (1876).
Vespertilio horsfieldi, *Temminck, Monogr. Mammal.* ii. p. 226 (1835–41); *Wagner, Suppl. Schreb. Säugeth.* v. p. 737 (1855); *Dobson, l. c.*
Vespertilio macellus, *Temminck, l. c.* p. 230.
Vespertilio macropus, *Gould, Mammals of Australia*, iii. (1854).

The ear laid forward extends to the end of the nose; the inner margin of the ear-conch is very similar in shape to that of *V. dasycneme*, but there is a slight flattening in its upper third; the extremity is broadly triangular, with a rounded-off vertical angle; the upper half of the outer margin is straight, not at all concave, and the lower half very slightly convex, terminating opposite the base of the inner margin; tragus very similar in shape to that of *V. daubentonii*, but somewhat longer and narrower towards the tip, the inner margin straight, the outer slightly convex, attaining its greatest width slightly below the middle of the inner margin (Plate XVIII. fig. 4, ear, enlarged).

Wings from the ankles; calcaneum very long, extending more than three fourths the length of the posterior margin of the interfemoral on each side.

The fur of the body extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the distal third of the femur; the base of the interfemoral between the thighs only is covered, and a few long hairs appear on the backs of the toes. Beneath, the wing-membrane is covered with a few fine hairs as far as a line drawn from the elbow to the knee, but the interfemoral is as naked as upon the upper surface. The face is more hairy than in most of the species of this subgenus.

The first upper premolar occupies the space between the canine and the third premolar; the second upper premolar is extremely

small, *placed quite inside*, in the angle between the first and third premolars, and is not visible from without; the second lower premolar is about half the vertical height of the first, but not equal to one third its transverse diameter, and stands in the tooth-row.

The following Table exhibits the measurements—(I.) of the type, (II.) of the type of *Vespertilio macropus*, Gould*, and (III.) of an adult ♀ specimen preserved in alcohol.

	I.	II.	III.
Length, head and body	...	1·9	2·1
„ tail	...	1·5	1·75
„ head	...	0·65	0·65
„ ear	0·65	0·6	0·6
„ tragus	0·26	0·28	0·3
„ forearm	1·5	1·5	1·55
„ thumb	0·35	0·33	0·35
„ third finger	2·65	2·75	2·9
„ fifth finger	2·0	1·95	2·05
„ tibia	0·6	0·65	0·68
„ foot	0·48	0·48	0·48

Hab. Siam; Java; Borneo; Gerontalo, Celebes; Australia (Port Essington; Brisbane; Swan River; South Australia).

a, b. ♀, al. (nearly adult).	Siam.	W. H. Newman, Esq. [P.].
c. ad. sk.	North Australia.	Purchased.
d. ♂ ad., al.	Port Essington.	J. Macgillivray, Esq. [P.].
e. ♀ ad., al.	Port Essington.	Earl of Derby [P.].
f. ad. sk., in al.	Australia.	J. Gould, Esq. [P.].
	(Type of *Vespertilio macropus*, Gould.)	
g. ♂ ad., al.	Australia.	Earl of Derby [P.].
h, i. ad. sks.	Swan River, Australia.	Sir G. Grey [P.].
j, k. ad. sks.	South Australia.	J. Gould, Esq. [P.].

5. Vespertilio capaccinii.

Vespertilio capaccinii, *Bonap. Fauna Italica*, 1832, fasc. xx.; *Temm. Monogr. Mammal.* ii. p. 189 (1839–41); *Dobson, Monogr. Asiat. Chiropt.* p. 129 (1876).

* I have directly compared the types of *V. adversus*, Horsf., and of *V. macropus*, Gould (the former from Java, the latter from North Australia), and am quite unable to discover any difference. Both agree in dentition, in the form of the head and ears, and in all other respects; so that I am obliged to consider the Australian specimens as belonging to the same species as Horsfield's type from Java, and consequently assign to this species a wider distribution than I could have expected, seeing that the Bats of the Australian Region are almost altogether distinct from those of the Oriental.

I have also examined the types of *V. macellus*, Temminck (preserved in the Leyden Museum), and find that this species from Borneo is also undoubtedly the same as *V. adversus*, Horsf., with which it agrees in all external characters as well as in the peculiar position of the second upper premolar. As Dr. Peters has remarked (MB. Akad. Berl. 1866, p. 680), there are some skulls in the Leyden Museum, labelled *Vespertilio macellus* in Temminck's handwriting, which undoubtedly belong to the species described by Temminck under the name *Vespertilio macrotis* (= *Vespertilio* (*Vesperugo*) *imbricatus*, Horsfield).

Vespertilio megapodius, *Temm. l. c.* p. 189.
Vespertilio macrodactylus, *Temm. l. c.* p. 231 (vide *Peters, in MB. Akad. Berl.* 1866, p. 679).

Ears slightly shorter than the head; laid forwards their extremities reach the end of the nose; upper third of the inner margin straight, tip shortly rounded off; outer margin flattened beneath the tip, becoming convex opposite the summit of the tragus, and ending abruptly opposite the base of its inner margin. Tragus long and very acutely pointed, the lower half of the inner margin straight, the upper half convex, corresponding to a distinct concavity of the upper third of the outer margin, which gives to the upper part of the tragus an outward inclination; at the base of the outer margin a distinct, small, rounded lobe, above which the outer margin becomes strongly convex (Plate XVIII. fig. 3, ear, enlarged).

The wing-membrane is attached to the tibia a short distance above the ankle; calcaneum reaching three fourths the distance from the ankle to the tail.

On the upper surface the wing-membrane is covered with soft fur as far as a line drawn from the elbow to the tips of the toes when the foot is drawn outwards and forwards; the legs and interfemoral membrane are clothed with similar fur as far as a line drawn between the ankles; beneath, the wing-membrane is clothed as far as a line drawn between the elbow- and knee-joints, and the interfemoral as far as a line extending between the ankles; the hairs also cross the tibia and occupy the angle of the wing-membrane contained between its posterior margin and the tibiæ.

Fur, above, black at the base, with light brown tips; beneath, black with white extremities.

The first and second upper premolars are slightly drawn inwards; the second premolar minute, not half the size of the first premolar, and scarcely equalling in vertical extent the cingulum of the third premolar; the second lower premolar is almost equal to the first in vertical extent, but is not half its transverse diameter; the third lower premolar is almost equal to the canine in vertical extent.

Length (of an adult ♀ preserved in alcohol), head and body 2″, tail 1″·5, tail free from membrane 0″·15, head 0″·65, ear 0″·6, tragus 0″·3, forearm 1″·6, thumb 0″·3, third finger 2″·55, fifth finger 2″, tibia 0″·7, calcaneum 0″·55, foot 0″·5.

Hab. Southern Europe (Italy); Philippine Islands; Japan.

V. capaccinii is at once distinguished from all other species of this section by its very acutely pointed, outward curved tragus.

a.	♀ ad., al.	Turin.	Prof. Bonetti [P.].
b.	♀ ad., al.	No history.	

6. Vespertilio longipes.

Vespertilio macropus, *Dobson* (non *Gould*), *Proc. As. Soc. Beng.* 1872, p. 209.
Vespertilio longipes, *Dobson, l. c.* 1873, p. 110; *Monogr. Asiat. Chiropt.* p. 131 (1876).

Crown of the head rather abruptly and considerably raised above the face-line; muzzle narrow and pointed, with slightly projecting nostrils opening sublaterally, with an intervening emargination. The shape of the head and muzzle is similar to that of *Kerivoula hardwickii*. Ears as long as the head, narrow, tapering, with rounded-off tips; immediately beneath the tip about half the outer margin is hollowed out, the remaining lower half convex. Tragus very long and slender, slightly tapering towards the tip, which is rounded off (Plate XIX. fig. 1, ear, enlarged).

Wings from the ankles. Feet very large, about one fourth the length of the head and body; toes more than half the length of the whole foot, claws remarkably long and strong; the outer toe considerably shorter than the others, and with a somewhat larger claw.

Fur above black; beneath black, with whitish tips. The face is very hairy, and the upper lip is clothed with long straight hairs. The wing-membrane on the upper surface is covered with hair as far as a line connecting the junction of the proximal and middle thirds of the humerus with the knee-joint; from the knee the hairs pass backwards along the tibia to the back of the foot. The base of the interfemoral membrane, a little further back than a line joining the knee-joints, is covered, the remainder naked. Beneath, the wing-membrane is clothed as far as a line drawn from the elbow to the knee-joint, and half the interfemoral membrane has a few thinly spread hairs scattered over its surface.

The first and second upper premolars are very small, and (in the type specimens) not distinguishable without the aid of a lens.

The second upper premolar is but slightly internal to the first; in the lower jaw both premolars stand in the tooth-row. Lower canine very small, not equal to the first molar in vertical extent.

Length (of an adult ♂ preserved in alcohol), head and body 1″·75, tail 1″·45, head 0″·6, ear 0″·6, tragus 0″·3, forearm 1″·45, third finger 2″·3, fifth finger 1″·85, thumb 0″·3, tibia 0″·6, foot 0″·4.

Hab. Caves of Bhima Devi, Kashmir (elevation about 6000 feet), where the type specimens were obtained by Captain W. G. Murray.

Type in the collection of the Indian Museum, Calcutta.

a. ♂ ad., al. Caves of Bhima Devi, Kashmir. Calcutta Museum [E.].

7. Vespertilio dasycneme.

Vespertilio dasycneme, *Boie, Isis*, 1825, p. 1200; *Wagner, Suppl. Schreb. Säugeth.* v. p. 757 (1855); *Blasius, Fauna Deutschl.* p. 103, figs. 69, *a* & *b* (1857); *Dobson, Monogr. Asiat. Chiropt.* p. 129 (1876).

Vespertilio limnophilus, *Temminck, Monogr. Mammal.* ii. p. 176 (1839).

Ears shorter than the head, laid forwards the extremities do not reach to the end of the nose; inner margin of the ear-conch straight in its lower third, then regularly convex to the tip, which is obtusely

rounded off; the outer margin is straight or slightly concave beneath the tip for about one third of its length, becoming gradually convex, and terminating abruptly opposite the base of the inner margin. The tragus terminates in an obtuse rounded point; the inner margin is slightly concave, the outer convex.

Thumb armed with a very large claw. Wings from the distal extremity of the tibia; the point of origin of the wing-membrane is very sharply defined. The calcaneum extends rather more than halfway between the ankle and the tail.

Fur, above, dark at the base, the hairs with light brown extremities; beneath, black at the base, the extremities white.

Both the first and second upper premolars are drawn inwards, owing to the proximity of the third large premolar to the canine; the second premolar is extremely small, and more internal than the first. The lower incisors are not crowded; the second lower premolar is about half the size of the first premolar; the first premolar is less than the canine in vertical extent.

Length, head and body 2″·4, tail 2″, head 0″·75, ear 0″·6, tragus 0″·3 × 0″·09, forearm 1″·8, thumb 0″·35, third finger 3″·1, fifth finger 2″·4, tibia 0″·8, calcaneum 0″·65, foot 0″·4.

Hab. From Southern England to the Altai Mountains, probably generally distributed throughout the temperate regions of Europe and Asia. On the continent of Europe it is recorded from the Netherlands, France, Denmark, Prussia, Hungary, and Italy.

V. dasycneme is readily distinguished from all other species of this section by the form of the tragus, which resembles that of some of the species of the subgenus *Vesperus* (*Vesperugo*), and by the less amount of hair on the face.

a. ♀ ad., al. Galicia. G. E. Dobson, M.B. [E.].

8. Vespertilio ferrugineus.

Vespertilio ferrugineus, *Temminck, Monogr. Mammal.* ii. p. 239, pl. 58. fig. 2.

Ears shorter than the head, laid forwards the extremities reach almost to the end of the muzzle; inner margin of the ear-conch straight in lower and upper thirds and convex in the middle, the outer margin concave in upper half, so that the rather narrowly rounded-off tip projects outwards, then convex, emarginate opposite the base of the tragus and terminating in a small lobe; inner margin of the tragus straight, outer margin slightly convex, not attenuated above, subacutely pointed.

Wings from the ankles or tarsus; interfemoral membrane acutely angular behind, not fringed; last caudal vertebra free.

Fur moderately long on the upper surface, short beneath; above dark brown, the terminal third of the hairs light yellowish or ferruginous brown; beneath dark brown with greyish extremities, causing the whole under surface to appear ashy; ears and membranes brown.

Upper incisors nearly equal; first and second upper premolars on the inner side of the tooth-row, second premolar very small, third separated by a narrow space from the canine; first and second lower premolars in the tooth-row.

Length (of the type specimen), head and body about 2″·4, tail 1″·8, ear 0″·65, tragus 0″·28, forearm 1″·8, thumb 0″·35, third finger—metacarp. 1″·6, 1st ph. 0″·6, 2nd ph. 0″·8; fifth finger—metacarp. 1″·55, 1st ph. 0″·5, 2nd ph. 0″·4; tibia 0″·75, foot 0″·45.

Hab. Surinam.

Type in the collection of the Leyden Museum.

9. Vespertilio daubentonii.

Vespertilio daubentonii, *Leisler, Kuhl, Deutsch. Flederm. Ann. Wetterau. Gesellsch. Naturk.* p. 51 (1819); *Bonap. Fauna Italica*, fasc. xxi. (1835); *Temminck, Monogr. Mammal.* p. 186 (1835–41); *Bell, Brit. Quadrup.* p. 47, fig. (1837); *Wagner, Suppl. Schreb. Säugeth.* i. p. 493 (1844), v. p. 726 (1855); *Blasius, Fauna Deutschl.* p. 98, figs. 66, 67; *Dobson, Monogr. Asiat. Chiropt.* p. 132 (1876).

Vespertilio ædilis, *Jenyns, Ann. Nat. Hist.* 1839, p. 73.

Vespertilio volgensis, *Eversmann, Bullet. de Moscou*, i. p. 24 (1840).

Head very slightly raised above the face-line; ears moderately long, laid forwards the tips extend quite to the extremity of the muzzle, the inner margin forms a regular arc of a circle from the base to the tip; the tip is shortly rounded off; and the upper third of the outer margin is flat or concave, owing to the abrupt convexity of the succeeding middle third; tragus about half the length of the ear, the extremity straight, not curved outwards; the inner margin is straight, the outer has a very distinct triangular rounded lobe at the base, then becomes regularly slightly convex upwards, reaching its greatest width about the middle, and terminating in an acute point.

Wings from the metatarsi; calcaneum extending more than three fourths the distance between the ankle and the tail.

The face is sparingly covered with hair in front of the ears. The small labial glands are thinly clothed by some long straight hairs. On the dorsal surface the base of the interfemoral membrane as far as a line drawn between the centres of the tibia is covered; the tibiæ and the remaining part of the interfemoral naked.

Above, the hairs are dark at the base, with reddish-brown extremities; beneath, similar at the base, but with white extremities.

The upper incisors are equal in size, and have strongly diverging cusps; the second upper premolar stands in the tooth-row, is very small, not one third the size of the first premolar, and its summit very slightly exceeds the cingulum of the first molar.

Length (of an adult ♂ preserved in alcohol), head and body 1″·9, tail 1″·7, head 0″·65, ear 0″·55, tragus 0″·28, forearm 1″·45, thumb 0″·35, third finger 2″·4, fifth finger 1″·9, tibia 0″·6, foot 0″·4.

Hab. From Ireland to the Altai Mountains; from Finland to

Sicily; from the Altai Mountains to Tenasserim*. Probably generally distributed throughout Europe and the temperate regions of Asia north of the Himalaya; attaining the most northerly range of all the species of the genus. Found as far north as Banffshire in Scotland.

a. ad. sk.	England.	
b. ad., al.	Epping Forest.	F. Doubleday, Esq. [P.].
c. ad. sk.	Essex.	J. A. Tawell, Esq. [P.].
d. ad. ♂, al.	Northampton.	Rev. L. Jenyns [P.].
e. ad. sk.	Warwickshire.	R. F. Tomes, Esq. [P.].
f. ad. sk.	Devonshire.	Dr. W. E. Leach [P.].
h, *i*. ad. sks.	Scotland.	J. MacGillivray, Esq. [P.].
j, *k*. ad. sks.	Sweden.	Stockholm Museum [P.].
l. ad. sk.	Poland.	Purchased.
m, *n*. ad. sks.	Altai Mountains.	
o. ♀ imm., al.		M. Lidth de Jeude [P.].

10. Vespertilio megalopus.

Vespertilio megalopus, *Dobson, Ann. & Mag. N. H.* 1875, xvi. p. 261.

Very similar to *V. daubentonii*; but the ears are longer, much narrower and more acute, and, laid forwards, the tips pass beyond the end of the nose at least one tenth of an inch; the inner margin, instead of forming a regular arc from the base to the tip, is flattened along the upper third, and the narrow extremity of the ear is sharply rounded off. The tragus is also longer and narrower, and quite obtuse; the upper third of the inner margin is slightly concave; but the extremity is not directed inwards (Plate XVIII. fig. 2, ear, enlarged).

The wing-membrane does not extend so far down on the foot as in *V. daubentonii*; and the second upper premolar is slightly drawn inwards. In other respects, in general form and in the colour and distribution of the fur, this species closely resembles *V. daubentonii*, of which it may be considered the African representative.

Length (of a male specimen preserved in alcohol), head and body 1″·65, tail 1″·6, head 0″·6, ear 0″·55, tragus 0″·3, forearm 1″·45, thumb 0″·35, third finger 2″·3, fifth finger 1″·9, tibia 0″·6, foot 0″·4.

Hab. Western Equatorial Africa (Gaboon).

a. ♂ ad., al. (type).	Gaboon.	Purchased.
b. ♂ ad., al.	Gaboon.	Purchased.

11. Vespertilio fimbriatus.

Vespertilio fimbriatus, *Peters, P. Z. S.* 1870, p. 617. no. 2; *Dobson, Monogr. Asiat. Chiropt.* p. 144 (1876).
Vespertilio laniger, *Peters, l. c.* no. 3.

Ears remarkably narrow; the upper half of the ear-conch triangular, the outer margin slightly concave in upper half, convex below, terminating opposite the base of the tragus without forming a lobe;

* Two specimens lately obtained by Mr. Limborg at Ashown in Tenasserim agree in all respects with specimens of this species from England.

tragus about half the length of the inner margin of the ear, narrow and acutely pointed, outer margin convex immediately above the base, then concave, inner margin correspondingly convex. Face narrow and densely clothed with woolly hair. Wings from the metatarsi; feet rather large; tail (in the type specimen, a dried skin) wholly included within the interfemoral membrane.

Fur, above, black with brown tips; beneath, black with ashy tips. On the upper surface the fur extends to the membranes along the sides of the body only; beneath, a few fine hairs cover the wing-membrane as far as a line drawn from the elbow to the knee-joint; the interfemoral membrane is nearly naked, except where a few fine thinly spread hairs fringe the posterior free margin.

The canine and third premolar are rather close, so that the small first and second premolars are drawn inwards, the second more than the first.

Length (of the type specimen, a dried skin), head and body about 1″·6, tail about 1″, ear 0″·6, tragus 0″·28, forearm 1″·5, thumb 0″·3, third finger 2″·6, fifth finger 2″, tibia 0″·6, foot 0″·4.

Such are the characters of the type specimen, from Amoy, a dried skin in a very imperfect state of preservation.

A specimen in alcohol, in the collection of the Paris Museum, from Cochin China, appears to be referable to this species; but, as it differs apparently * in some important points from the Amoy specimens, I give the following description:—

Ears narrow, laid forwards the tips do not extend to the end of the nose; inner margin of the ear-conch straight in lower third, convex in middle third, straight in upper third, tips shortly rounded off; outer margin straight almost from the tip to its termination below, the slight convexity of the lower part commencing below the middle, and not forming any lobular projection; tragus rather short, and shaped as in *V. daubentonii*, the outer margin convex, the inner straight.

Wings from the tarsi; last caudal vertebra free; interfemoral membrane triangular behind; termination of calcaneum indistinct.

Fur, above, dark, extremities of the hairs greyish; beneath, similar, the terminal third of the hairs lighter than on the upper surface.

The canine and third premolar are separated by a rather small interval, and the second minute premolar is quite internal; in the lower jaw the second premolar stands in the tooth-row.

Length (of an adult ♀), head and body 1″·9, tail 1″·7, head 0″·65, ear 0″·6, tragus 0″·27, forearm 1″·35, thumb 1″·25, third finger 2″·6, fifth finger 1″·9, tibia 0″·55, foot 0″·4.

Hab. China (Amoy); ? Cochin China.

a. ad. sk., al. (type).	Amoy.	R. Swinhoe, Esq. [P.].
b. ad. sk.	Amoy.	R. Swinhoe, Esq. [P.].
c†. ? ad. sk.	Amoy.	R. Swinhoe, Esq. [P.].

* The differences in the dried skins may be mainly the result of imperfect preservation.

† Type of *V. laniger*, Peters.

13. Vespertilio davidii.

Vespertilio davidii, *Peters, MB. Akad. Berl.* 1869, p. 402; *Dobson, Monogr. Asiat. Chiropt.* p. 132 (1876).

Muzzle and ears as in *V. daubentonii*; laid forwards the extremity of the ear extends exactly to the end of the muzzle; the outer margin of the ear-conch terminates in a small distinct round lobe. Tragus long, subacute, attenuated in upper third; inner margin straight, lower two thirds of outer margin convex, upper one third straight; a distinct lobule at the base.

Wings from the base of the toes; feet rather large; toes nearly equal in length; last two caudal vertebræ free; the calcaneum extends somewhat more than half the distance between the ankle and the tail.

Fur, above, dark, with light-brown tips; beneath, similar, with grey or ashy extremities. Above and beneath, the wing- and interfemoral membranes are covered along the sides of the body only.

The second upper premolar is very small, and placed internally in the angle between the closely approximated first and third premolars; in the lower jaw the second premolar is also very small and internal, but the first and third premolars are separated by a small interval.

This species is very like *V. daubentonii*; but the outer margin of the ear is less concave in its upper half, and the lower half is less convex; it is also distinguished by the position of the second premolar (which, as described above, is internal to the tooth-row in both jaws), by the projecting caudal vertebræ, and by the attachment of the wing-membrane, which extends quite to the base of the toes.

Length (of the type specimen), head and body 1″·7, tail 1″·3, head 0″·58, ear 0″·56 × 0″·3, tragus 0″·28, forearm 1″·25, thumb 0″·28, third finger 1″·7, fifth finger 1″·4, tibia 0″·5, calcaneum 0″·58, foot 0″·33.

Hab. Pekin, China.

Type in the collection of the Paris Museum.

13. Vespertilio bocagii.

Vespertilio bocagii, *Peters, Jorn. de Sci. Math.-Phys. e Nat. Lisboa,* 1870, no. 10.

The crown of the head is slightly, but rather abruptly, elevated above the face-line, the muzzle rather short, and the glandular prominences small. Ears shorter than the head, laid forward the tips extend exactly to the end of the nose; in general shape very similar to those of *V. mystacinus*, but the tip is more directed outwards and the lower half of the outer margin less convex. The tragus is also like that of *V. mystacinus*, but is proportionately shorter, narrower, and more acutely pointed, and the lobe at the base of the outer margin is triangular, not rounded (Plate XVIII. fig. 6, ear, double natural size; tragus rather too broad).

Wings from the base of the toes; calcaneum terminating in a distinct small projection; last caudal vertebra quite free; feet rather broad and flat.

The face in front of the eyes is very thinly covered, and the lips scarcely fringed except with a few fine hairs; the inner surface of the ear-conch is thinly covered with short hairs arising from small glandular papillæ; the wing-membranes above and beneath are almost naked, the fur of the body extending upon them along the sides of the body only; on the upper surface the base of the interfemoral is covered, beneath naked but thickly dotted over with small white elevations.

Fur very short above and beneath. On the dorsal surface bright ferruginous red, dark or black at the base; beneath, dark with ashy extremities.

Dentition quite similar to that of *V. mystacinus*.

Length (of an adult ♂), head and body 1″·65, tail 1″·5, head 0″·6, ear 0″·5, tragus 0″·25, forearm 1″·35, thumb 0″·3, third finger 2″·5, fifth finger 1″·9, tibia 0″·55, calcaneum 0″·45, foot 0″·35.

Hab. West Africa.

This species is readily distinguished by its very narrow but straight tragus, with a convex outer margin, and the shortness and bright-red colour of the fur on the dorsal surface, together with its size and shape of the ears, in which it resembles *V. mystacinus*.

a. ♂ ad., al. West Africa. Captain Burton [P.].

Subgenus VESPERTILIO.

14. Vespertilio goudotii.

Vespertilio goudotii, *Smith, African Zoology*, p. 132 (1834).
Vespertilio madagascariensis, *Tomes, P. Z. S.* 1858, p. 89.
? Vespertilio sylvicola *, *Grandidier, Rev. et Mag. Zool.* 1870, p. 49.

Ears large, nearly as long as the head, rounded at the tips, with a deep angular emargination occupying the upper third of the outer margin, the remaining two thirds strongly convex and terminating in a small lobe (Plate XIX. fig. 6); tragus moderate, on the inner side convex, so that the acutely pointed attenuated extremity inclines outwards, externally convex below, and slightly concave in the upper third, at the base a well-defined horizontal lobule. Nostrils prominent, opening downwards and outwards, separated by a shallow emargination above and in front. Crown of the head vaulted behind the slender muzzle.

Feet rather large; the wing-membrane terminates at the end of the tarsus; the extreme tip of the tail free.

Above, dull chestnut, the base of the hairs dusky; beneath, the extremities of the hairs are pale brown or slightly ashy, dull black or dark brown at the base.

* The type of this species has been lost, and the description is insufficient.

The face and upper lip are densely covered with long hair, the extremity of the nose alone naked; the body is covered with long fine fur, but the wing-membranes are nearly naked. *The fur of the head, neck, and shoulders longer than that of the back*, which extends for a short distance upon the interfemoral membrane and terminates abruptly, leaving the rest of the membrane quite naked; beneath, a few very fine and short hairs spring from the transverse dotted lines.

Upper incisors rather long and nearly equal; outer incisors unicuspidate and vertical in direction; inner incisors in a plane anterior to the outer ones, and directed forwards and inwards; second upper premolars very small, drawn inwards, and not distinguishable without a lens. In the lower jaw the second premolar is about half the size of the first, but much larger than the corresponding tooth above; it also lies slightly internal to the first premolar.

Length (of a dried specimen), head and body 1″·5, tail 1″·5, ear 0″·65, tragus 0″·3, forearm 1″·5, thumb 0″·28, third finger 2″·8, fifth finger 2″·1, tibia 0″·6, foot 0″·3.

Hab. Madagascar.

a, *b*. ad. sk.	Vohima, Madagascar.	Purchased.

15. Vespertilio nipalensis.

Vespertilio nipalensis, *Dobson, Proc. As. Soc. Beng.* 1871, p. 214; *Monogr. Asiat. Chiropt.* p. 142, figs. *a*, *b* (1876).

Crown of the head almost level with the face-line; muzzle narrow, appearing somewhat broader near its extremity, owing to the small glandular prominences between the eyes and nostrils; nostrils opening sublaterally without intervening emargination. Ears shorter than the head, narrow, and pointed; outer margin of the ear-conch deeply hollowed out immediately beneath the tip, which projects outwards considerably; the lower half of the outer margin is slightly convex, and terminates a short distance in front of the base of the tragus, not forming any lobe or anterior projection; tragus long, narrow, and pointed, curved slightly outwards; at the base, on the outer margin, a small lobule is placed, which in this species appears unusually long.

Wing-membrane from the base of the toes; toes long, about two thirds the length of the whole foot.

The fur of the head and back is long and dense, bicoloured, from the base upwards black with brown tips; beneath, the hairs are black for two thirds their length, the remaining portion to the tip *pure white*. The whole under surface of specimens dried from spirit appears white, and the dark portions of the hairs are not perceived till the fur is raised. Between the eyes, and as far as the slight glandular prominences of the muzzle, the face is covered with very long dense fur of the same quality as that on the back of the head; in front of the base of the ear and about the eye the fur is very

short and thin; and the same kind of fur also clothes the glandular prominences, interspersed with long straight hairs. On the upper surface the wing-membranes are clothed along the sides of the body only; beneath they are covered as far as a line drawn between the middle of the humerus and femur; behind about half the upper surface of the interfemoral membrane is clothed with a few short thinly spread hairs; the under surface is similarly covered, but the hairs extend further back along the tail.

The canines in both jaws are very short, in the lower jaw resembling premolars; the first and second premolars are minute, and in the upper jaw scarcely distinguishable without the aid of a lens.

Length (of an adult ♀ preserved in alcohol), head and body 1″·65, tail 1″·35, head 0″·6, ear 0″·48, tragus 0″·25, forearm 1″·35, thumb 0″·25, third finger 2″·3, fifth finger 1″·75, tibia 0″·6, foot 0″·3, calcaneum 0″·6.

Hab. Katmandu, Nipal.

Type in the collection of the Indian Museum, Calcutta.

16. Vespertilio emarginatus.

Vespertilio emarginatus, *Geoffroy, Ann. du Muséum*, vol. viii. p. 198; *Macgillivray, Natural. Library*, vii. p. 96 (1838); *De Selys-Longchamps, Fauna Belge* (1842); *Dobson, Monogr. Asiat. Chiropt.* p. 142 (1876).

? Vespertilio epichrysus, *Temminck, Monogr. Mamm.* ii. p. 208 (1835–41).

Vespertilio mystacinus, *Keys. & Blas. Wiegm. Archiv*, 1839, p. 310.

Vespertilio ciliatus, *Blasius, Wiegm. Archiv*, 1853, p. 288; *Fauna Deutschl.* p. 91, figs. 62, 63 (1857).

Crown of the head very slightly raised above the face-line; muzzle long, sloping evenly downwards on the sides to the margin of the upper lip; extremity of nose projecting slightly. Ears nearly as long as the head; laid forwards the tips extend to the end of the nose; the horizontal margin of the internal basal lobe forms a right angle with the ascending margin, which in its lower fourth is straight, and then slightly convex to the tip; the tip is shortly rounded off; beneath it the upper third of the outer margin is deeply emarginate (but the tip scarcely projects outwards), then very abruptly convex, and terminating in a small lobe curved inwards. Tragus long, narrow above and acutely pointed, reaching nearly to the edge of the emarginate portion of the outer margin of the conch; the inner margin slightly convex; the outer margin convex below, with a small lobe at the base, concave above, so that the tragus is directed outwards.

Wings to the base of the claws; extreme tip of the tail free.

On the upper surface the fur of the body extends thinly upon the wing-membranes as far as a line drawn from the middle of the humerus to the knee-joint; upon the interfemoral as far as a line drawn from one tibia to the other; also upon the legs as far as the ankles, and upon the toes very sparingly; the posterior margin of

the interfemoral is fringed by a few short fine hairs. Beneath, the wing-membrane is covered with very few fine hairs ranged along the transverse lines as far as a line drawn from the elbow to the knee, and the interfemoral has a patch of thinly spread hairs about the root of the tail. The face is rather thickly covered with short hairs; the margin of the upper lip is fringed with long hairs, and the chin is similarly covered; the ear-conch is clothed internally with short hairs arising from papillæ, as in *Kerivoula*, but the integument of the ears is rather thicker than in the species of that genus.

Fur, above, dark brown at the base, then light brown with reddish-brown tips; beneath, similar, with much lighter-coloured extremities. Ears and membranes reddish brown.

The first upper premolar stands in the tooth-row, is about half the vertical height of the third premolar, and the bases of these teeth nearly touch; the second premolar is very small, not one third the size of the first premolar, and is crushed inwards; the first lower premolar is somewhat more than half the vertical height of the canine; the second premolar is scarcely two thirds the size of the first; and the third premolar exceeds the first molar in vertical extent.

Length (of an adult ♀ preserved in spirit), head and body 1″·75, tail 1″·65, head 0″·75, ear 0″·75, tragus 0″·35, forearm 1″·58, thumb 0″·35, third finger 2″·55, fourth finger 2″·1, fifth finger 2″·1, tibia 0″·75, foot 0″·38.

Hab. Middle and Southern Europe, extending from France and Rhenish Prussia to Italy.

Var. *a* (*Vespertilio desertorum*).

Vespertilio desertorum, *Dobson, Blanford, Ann. & M. N. H.* 1875, xvi. p. 309; *Dobson, Monogr. Asiat. Chiropt.* p. 144 (1876); *Blanford, Eastern Persia*, ii. p. 20, with woodcut of head (1877).

Similar to *V. emarginatus* in structure, but distinguished by its greater size, much lighter colour of the fur and membranes, and especially by the upper incisors, which are parallel and close together.

Calcaneum distinct, terminating in a well-marked small projecting lappet of skin; ears very thin; glandular papillæ distinct.

Fur, above and beneath, very light-coloured; ears and interfemoral membranes pale yellowish white; wing-membranes dusky white.

The fur on the back is tricoloured, dark at the base, then pale straw-coloured, the extremities very light reddish brown; beneath, dark at the base of the hairs, the extremities very pale straw-colour.

Length (of an adult ♀ preserved in spirit), head and body 2″·1, head 0″·75, tail 1″·6, ear 0″·65, tragus 0″·35, forearm 1″·75, thumb 0″·35, third finger 2″·8, fourth finger 2″·25, fifth finger 2″·35, tibia 0″·8, calcaneum 0″·5, foot 0″·45.

Hab. Baluchistan.

This appears to be the representative of *V. emarginatus* in Baluchistan and surrounding countries. The above described well-marked characters (derived from an examination of several specimens preserved in alcohol), though apparently constant, do not, in my opinion, justify complete separation as a species distinct from the European form.

a, *b*. ♀ ad., al. Talk, Baluchistan. W. T. Blanford, Esq. [C.].

17. Vespertilio tricolor.

Vespertilio tricolor, *Temminck, Monogr. Mammal.* ii. p. 207 (1835–41); *Wagner, Suppl. Schreb. Säugeth.* v. p. 745 (1855).

Resembles *V. emarginatus* closely in general form, and even in the quality, colour, and distribution of the fur; but is easily distinguished by its greater size and conspicuously shorter ears, which are much less abruptly convex in the lower two thirds of the outer margin; the tragus is also much curved outwards, and the extremity of the tail does not project.

In general form the skull differs considerably from that of *V. emarginatus*, being proportionally much broader in front, and the brain-case less vaulted and raised above the facial bones. In *V. emarginatus* the inner incisor is quite equal to the outer; in this species it is conspicuously larger and the posterior cusp longer; the first upper premolar also occupies the whole space between the canine and third premolar, and the second premolar is quite internal; in *V. emarginatus* the second premolar is half internal and quite visible in the space between the first and third premolars.

Length (of the type specimen), head and body about 2″·5, tail 1″·8, head 0″·8, ear 0″·55, tragus 0″·3, forearm 1″·9; third finger—metacarp. 1″·8, 1st ph. 0″·7, 2nd ph. 0″·85; fourth finger—metacarp. 1″·75, 1st ph. 0″·55, 2nd ph. 0″·5; fifth finger—metacarp. 1″·7, 1st ph. 0″·5, 2nd ph. 0″·5; tibia 0″·8, foot 0″·43.

Hab. South Africa (Cape of Good Hope).

Type in the collection of the Leyden Museum.

18. Vespertilio oreias.

Vespertilio oreias, *Temminck, Monogr. Mammal.* ii. p. 270 (1835–1841).

Ears apparently as long as the head; the inner margin of the ear-conch straight in its lower, convex in its middle and upper thirds; the upper half of the outer margin flatly emarginate, then convex, but not abruptly so as in *V. emarginatus*: tragus much attenuated, almost as much as in *Kerivoula*, and inclined slightly outwards; the outer margin slightly concave above, the inner slightly convex.

Wings from the base of the toes; feet rather small; half the last caudal vertebra free.

Fur rather long and dense, extending densely upon the face

nearly to the end of the muzzle; ears naked or with a few fine hairs only.

Above dark brown, with yellowish-brown extremities; beneath similar, the tips of the hairs pale yellow.

Upper incisors equal; both the upper premolars stand in the tooth-row.

Length (of the type specimen), ear 0″·65, tragus 0″·35, forearm 1″·5, third finger 2″·3, fifth finger 1″·9, tibia 0″·7, foot 0″·3.

Hab. Singapore.

Type in the collection of the Leyden Museum.

Dr. Peters has identified *V. oreias* with *V. emarginatus*. It is undoubtedly closely allied to that species, but the form of the ear is quite different; both the upper premolars stand in the tooth-row, and the fur is bicoloured and much darker than in *V. emarginatus*.

19. Vespertilio welwitschii.

Scotophilus welwitschii, *Gray*, *P. Z. S.* 1866, p. 211, pl. xxiv.

Head moderately elevated; muzzle broad, shaped like that of *V. nattereri*, sloping evenly down to the upper lip; ears long and narrow, laid forwards the tips extend slightly beyond the end of the nose; lower third of inner margin of the ear straight, upper two thirds convex to the tip, as in *V. murinus*; tip shortly rounded off and projecting externally, owing to an abrupt emargination of the outer margin causing the upper part of the ear to appear narrow, below this the outer margin is faintly convex, very slightly concave opposite the middle third of the tragus, then again convex to its termination opposite the base of the inner margin; on the inner surface of the external basal lobe a small vertical lobe, as in *V. murinus*. Tragus long, attenuated in its upper third, and acutely pointed; upper two thirds of its inner margin slightly convex; at the base of the outer margin a very distinct rounded lobe, above which the outer margin becomes convex and reaches its greatest width slightly above the base of the inner margin (Plate XIX. fig. 3, ear, enlarged).

Wings from the metatarsi close to base of toes. Feet slender; calcaneum long, extending three fourths the distance between the foot and the tip of the tail, terminating in a small projection. Tail wholly included except the extreme tip, equal to the head and body in length.

The wing-membranes are variegated with orange and black, as in *V. formosus*, but, in addition, the upper surface of the interfemoral membrane, which in that species is wholly orange, is, in *V. welwitschii*, margined behind by a black band and dotted over with small black dots, which also appear upon the orange-coloured portion of the wings between the humerus and the femur, and on the forearm and legs.

The head is covered with long hair; in front of the eyes the face is rather thickly covered with short hairs, and the margin of the upper lip is fringed. The wing-membranes are nearly naked, and the fur of the back extends upon the interfemoral at the base of the tail

only. Posteriorly the free margin of the interfemoral between the ends of the calcanea is fringed with fine straight hairs.

Above, dark at the base for about one fourth the length of the hairs, then pale straw-colour, extremities reddish; beneath, the very base only is dark, the remainder of the hairs dull straw-colour.

Dentition quite similar to that of *V. murinus*.

Length (of an adult ♂ preserved in alcohol), head and body 2″·4, tail 2″·4, head 0″·8, ear 1″, tragus 0″·4, forearm 2″·05, thumb 0″·35, third finger 4″, fifth finger 2″·7, tibia 0″·85, foot 0″·5.

Hab. Angola, West Africa.

a. ♂ ad., al. (type). Angola. Dr. Welwitsch [C.].

20. Vespertilio nattereri.

Vespertilio nattereri, *Kuhl, Deutsch. Fledermäuse, Annal. Wetter. Gesellsch. Naturk.* Bd. i. p. 33 (1819); *Temm. Monogr. Mamm.* ii. p. 185; *Bell, Brit. Quadrup.* p. 42 (1837); *Wagner, Suppl. Schreb. Säugeth.* v. p. 723 (1855); *Blasius, Fauna Deutschl.* p. 88 (1857).

Head considerably raised above the face-line; muzzle broad, sides not prominent, evenly sloping down to the edge of the upper lip. Ears long, laid forwards they extend at least one tenth of an inch beyond the end of the nose; in general shape oval, with evenly rounded extremities, the convexity of the ear interrupted in the upper third of the outer margin only by slight flattening; the inner margin is regularly convex from the base to the tip; near the termination of the outer margin a small vertically placed outer lobe (the antitragus) is well marked in this species. The tragus is very long, quite three fourths the diameter of the ear-conch, narrow and subacutely pointed, the inner margin slightly convex, the outer correspondingly concave; at the base of the outer margin a distinct horizontal lobe succeeded by an emargination, immediately above which, opposite the base of the inner margin, the tragus suddenly attains its greatest width.

Wings from the base of the toes or close to them; calcaneum long; tip of tail projecting; the portion of membrane between the end of the calcaneum and the tail is fringed with short stiff hairs. This fringe of hairs readily distinguishes the species. Fur very long and dense; above dark brown, with light reddish-brown tips; beneath darker at the base, the terminal third of the hairs white.

First and second premolars small, the second about half the first in vertical extent, but scarcely one third its bulk and slightly internal to it. In the lower jaw the second premolar is very slender, about half the height of the first premolar, and, though standing in the tooth-row, placed in a plane distinctly internal to the first premolar, which slants slightly outwards.

Length (of an adult ♀ preserved in alcohol), head and body 1″·65, tail 1″·65, head 0″·65, ear 0″·7, tragus 0″·4, forearm 1″·45, thumb 0″·3, third finger 2″·6, fifth finger 1″·9, tibia 0″·6, calcaneum 0″·85, foot 0″·35.

Hab. Middle Europe, from Ireland to the Ural Mountains, and from Southern Sweden to the Alps.

This species appears to connect the genera *Vespertilio* and *Kerivoula*, agreeing with the species of the former genus in detention and, slightly, in the form of the ears; while the form of the head, the semitransparent ears marked with glandular papillæ, the great length of the tail, the long calcanea curved backwards, and fringed interfemoral membrane connect it closely with the species of *Kerivoula*.

a, *b*. ad. sk.	England.	
c. ♀ ad., al.	England.	Dr. J. E. Gray [P.].
d. ♀ ad., al.	England.	H. Doubleday, Esq. [P.].
e, *f*. ♂ & ♀ ad., al.	England.	Purchased.
g–*k*. ♀ ad., al.	England.	Lord Lilford [P.].
l. ad. sk.	New Forest.	F. Bond, Esq. [P.].
m, *n*. ad. sk.	Warwickshire.	R. F. Tomes, Esq. [P.].
o. ♀ ad., al.	Inverary.	Duke of Argyll.
p. ad., al.	Co. Longford, Ireland.	G. E. Dobson, M.B. [P.].
q. ♀ ad., al.		M. Lidth de Jeude [C.].
r–*u*. ♂ & ♀ ad., al.		
v–*z*. ♂ & ♀ juv. et ad.		Zool. Soc. Coll.

21. Vespertilio bechsteinii.

Vespertilio bechsteinii, *Leisler, Kuhl, Deutsch. Flederm. Ann. Wetterau. Gesellsch. Naturk.* Bd. i. p. 30 (1819); *Temm. Monogr. Mammal.* ii. p. 184 (1835–41); *Bell, Brit. Quadrup.* p. 40, fig. (1837); *Wagner, Suppl. Schreb. Säugeth.* v. p. 723 (1855); *Blasius, Fauna Deutschl.* p. 85, figs. 58, 59 (1857).

Ears narrow, much longer than the head; outer margin of the ear-conch very slightly flattened beneath the tip, the remaining portion as far as the base of the tragus convex, then slightly emarginate, and terminating in a convex lobe: tragus long, attenuated, and curved outwards above; upper half of the inner margin convex, outer margin correspondingly concave above (Plate XVIII. fig. 12, ear, enlarged).

Wings from the base of the toes; the last rudimentary caudal vertebra free.

Fur, above and beneath, dark brown at the base; the extremities of the hairs above light reddish, beneath white. Distribution of the fur as in *V. murinus*.

Length (of an adult specimen), head and body 2″, tail 1″·5, head 0″·75, ear 0″·95, tragus 0″·48, forearm 1″·55, second finger 2″·7, fourth finger 2″·1, tibia 0″·8, foot and claws 0″·35.

Hab. Europe (from Southern England to Southern Russia, and from Sweden to the Alps).

V. bechsteinii resembles *V. murinus* in general form, but is readily distinguished from that species by the proportionally much longer ears, by the very different form of the tragus, by the wing-membrane extending quite to the base of the toes, and also by its considerably smaller size.

a. ad. sk.	Hampshire.	
b–*f*. ♂ & ♀ juv., al.	New Forest.	F. Bond, Esq. [P.].
g. ad. sk.	Europe.	Leyden Museum [P.].
h. ♂ imm., al.	No history.	

22. Vespertilio murinus.

Vespertilio murinus, *Schreb. Säugeth.* i. p. 165, pl. li. (1775); *Geoffroy, Ann. du Muséum*, viii. p. 191; *Bonap. Fauna Italica*, fasc. xxi. (1831); *Temminck, Monogr. Mammal.* ii. p. 177 (1835–41); *Bell, Brit. Quadr.* p. 37, fig. (1837); *De Selys-Longchamps, Fauna Belge* (1843); *Wagner, Suppl. Schreb. Säugeth.* i. p. 490, v. p. 723; *Blasius, Fauna Deutschl.* p. 82, figs. 56, 57 (1857); *Dobson, Monogr. Asiat. Chiropt.* pp. 137, 139, fig. *b* (ear) (1876).
Vespertilio myotis, *Bechstein, Naturg. Deutschl.* p. 1154; *Kuhl, Deutsch. Flederm. Ann. Wetter. Gesellsch. Naturk.* p. 36 (1819).
Vespertilio blythii, *Tomes, P. Z. S.* 1857, p. 53.
Myotis murinus, *Jerdon, Mammals of India*, p. 46 (1867).

Head slightly elevated above the face-line; muzzle conical; nostrils close together in front; ears large, laid forwards the tips extend about one tenth of an inch beyond the end of the muzzle; horizontal basal lobe angular in front, the horizontal margin joining the ascending part of the inner margin under a right angle; the lower fourth of the inner margin is straight, the remaining portion regularly convex to the tip, which is rounded off; outer margin concave beneath the tip, straight or faintly convex about the middle, emarginate opposite the base of the tragus, terminating in a convex lobe opposite the base of the inner margin: tragus long, narrow, and subacutely pointed; inner margin straight, outer margin with an obliquely placed rounded lobe at the base, above which it becomes convex, and the tragus reaches its greatest width opposite the junction of the lower and middle thirds of its inner margin; the convexity of the outer margin rapidly lessening upwards, so that it is straight in its upper half, not curved outwards (Plate XVIII. fig. 10, ear, enlarged).

Wings from the metatarsi near the base of the toes; tail wholly contained, except the last rudimentary vertebra, within the interfemoral membrane.

Fur, above, light reddish or smoke-brown; beneath, dirty white; the base of the hairs, above and beneath, dark.

The second upper premolar is scarcely half the first, both in vertical extent and in cross section; it is generally much pressed inwards in the angle between the first and third premolars.

Length (of an adult ♀ preserved in alcohol), head and body 2″·8, tail 2″·1, head 1″, ear 1″·1, tragus 0″·45, forearm 2″·35, thumb 0″·5, third finger 3″·9, fifth finger 3″, tibia 1″, foot 0″·5.

Hab. Europe, Asia, Northern Africa, and Abyssinia, apparently almost limited to the Palæarctic Region, and not extending further north than Southern England and Denmark.

a. ad. sk.	England.	
b. ad. sk.	France.	
c. ad. sk.	St. Maurice, France.	
d. ad. sk.	Moravia.	Purchased.
e. ad. sk.	Hamburg.	Dr. J. E. Gray [P.].
f, g. ♂ ad., al.	Schlangenbad.	Dr. Günther [P.].
h. ad. sk.	St. Gothard.	
i, j. ♂ ad., al.	Seville, Spain.	Lord Lilford [P.].

k. ♀ ad., al.	Sicily.	
l. ♀ ad., al.	Sicily.	St. George Mivart [P.].
m. ad. sk.	Algiers.	Verreaux Coll.
n. ♀ ad., al.	Tangiers.	Purchased.
o, *p*. ♀ ad., al.	Tunis.	Purchased.
q. ♀ imm., al.	Tunis.	Purchased.
r, *s*. ad. sk.	El Jeen.	Purchased.
t. ♀, ad., al.	Abyssinia.	Purchased.
u. ad. sk.	India.	Warwick Coll.
	(Type of *V. blythii*, Tomes.)	
v. skull of *s*.		
w, *x*. skulls.	Lake of Constance.	Dr. Günther [P.].

23. Vespertilio africanus.

Vespertilio africanus, *Dobson, Ann. & Mag. Nat. Hist.* vol. xvi. p. 200 (1875).

Ears shorter than the head; laid forwards the tips do not reach to the end of the muzzle; tragus straight, acutely pointed (Plate XVIII. fig. 11, ear, enlarged). Glands on the side of the muzzle forming a conspicuous rounded elevation on either side between the eye and nostril.

Fur, above, dark at the base, with greyish extremities; beneath, the basal half of the hairs is dark, the terminal half white.

Distribution of the fur and dentition as in *V. murinus*.

Length (of an adult ♂ preserved in alcohol), head and body 2″·5, tail 2″·3, head 0″·9, ear 0″·85, tragus 0″·4 × 0″·1, forearm 2″·2, thumb 0″·45, third finger 3″·7, fifth finger 3″, tibia 1″·05, foot 0″·45.

Hab. Western Equatorial Africa (Gaboon).

This species is very closely allied to *V. murinus*, but is at once distinguished by the much shorter ears, acutely pointed tragus, and great development of the glands of the muzzle. The wing-membrane also does not extend so far outwards along the foot as in *V. murinus*, and the inner side of the ear-conch is less hairy.

a. ♂ ad., al. (type).	Gaboon, West Africa.	Purchased.

24. Vespertilio murinoides.

Vespertilio murinoides, *Dobson, Journ. Asiat. Soc. Beng.* 1873, p. 205; *Monogr. Asiat. Chiropt.* p. 139, fig. *a* (1876).

Ears slightly shorter than the head; general form of the ear-conch triangular, with narrow rounded tips; the inner margin very faintly convex, almost straight in its upper third; the outer margin concave beneath the tip, the remaining portion convex, with a faint concavity opposite the base of the tragus.

In *Vespertilio murinus* the inner margin of the ear is strongly convex from the base to the tip, the concavity of the outer margin beneath the tip is very feeble, and there is a distinct emargination, almost angular, opposite the base of the tragus, succeeded by a well-developed terminal lobe; the general form of the ear, moreover, is oval, not triangular.

The tragus is slender and acutely pointed, with a quadrangular

lobe at the base of the outer margin. In *V. murinus* the tragus is subacutely pointed, and the lobe at its base is remarkably small.

Fur dark brown above, with light-brown tips; beneath, dark brown, almost black, with greyish tips.

The first upper premolar is very small, scarcely visible from without, and not much larger than the second. In *V. murinus* this tooth is distinctly visible from without, and is much larger than the second premolar.

Length (of an adult ♀ preserved in alcohol), head and body 2″·5, tail 2″·1, head 0″·9, ear 0″·85, tragus 0″·4, forearm 2″·1, thumb 0″·4, third finger 3″·4, fifth finger 2″·8, tibia 0″·9, calcaneum 0″·9, foot 0″·5.

Hab. N.W. Himalaya (Chamba), at an elevation of 3000 feet.

Type in the collection of the Indian Museum, Calcutta.

25. Vespertilio chinensis.

Vespertilio chinensis, *Tomes, P. Z. S.* 1857, p. 52; *Dobson, Monogr. Asiat. Chiropt.* p. 139 (1876).

Muzzle long; nostrils prominent, opening sublaterally; crown of the head very slightly raised above the face-line; ears narrow, tapering, tip narrowly rounded off; outer margin straight above, faintly convex opposite the middle of the tragus and thence downwards to its termination: tragus attenuated towards the tip, inner margin straight or faintly concave, outer margin convex below, straight above, attaining its greatest convexity slightly below the middle of the inner margin. (Plate XIX. fig. 2, ear, double natural size).

Fur dark brown above, the extreme tips paler; beneath similar, but with paler greyish-brown tips on the chest and abdomen, darker along the sides of the body.

First and second upper premolars very small, the first acutely pointed, the second internal to it and the third premolar. The premolar and molar series in both jaws very similar to that of *V. murinus*.

Length, head and body about 3″·7, tail about 2″·1, head 1″, ear 0″·7, tragus 0″·3, forearm 2″·5, thumb 0″·5, third finger 4″, fifth finger 2″·2, tibia 1″, foot 0″·55.

This is the largest species of *Vespertilio* yet discovered.

Hab. China.

a. ad. sk. (type)	China.	Mr. Fortune [C.].

26. Vespertilio formosus.

Vespertilio formosus, *Hodgson, J. A. S. B.* iv. p. 700 (1835); *P. Z. S.* 1836, p. 46; *Wagner, Suppl. Schreb. Säugeth.* v. p. 736 (1855); *Tomes, P. Z. S.* 1858, p. 82, pl. lx.; *Dobson, Monogr. Asiat. Chiropt.* p. 140 (1876).

Kerivoula formosa, *Gray, List of Mammals in Coll. Brit. Mus.* p. 27 (1843).

Vespertilio rufo-pictus, *Waterhouse, Ann. & Mag. Nat. Hist.* xvi. p. 54 (1845); *Tomes, P. Z. S.* 1858, p. 85.

Vespertilio (Kerivoula) formosa, *Horsfield, Cat. Mammal. Mus. E. I. Comp.* p. 41 (1851).
Kerivoula pallida, *Blyth, Catal. Mamm. Mus. Asiat. Soc. Beng.* p. 34 (1863).
Murina formosa, *Jerdon, Mammals of India*, p. 42 (1867).
Vespertilio auratus, *Dobson, J. A. S. B.* xl. p. 186, pl. x. (1871).

Head very slightly elevated above the face-line; muzzle conical, not concave between the crown of the head and anterior extremities of the nasal bones; extremity of the nose projecting slightly beyond the upper lip, with a very shallow concavity between the nostrils, which open sublaterally. Ears ovate, with rounded tips directed outwards; the outer margin is abruptly and irregularly concave beneath the tip for about one third its length, then gradually convex and terminating opposite the basal lobe of the inner margin in a small lobe: tragus long, narrow, and obtusely pointed; inner margin straight, outer margin curved outwards at the base for about one third of its length, then ascending straight, equally inclined to the inner margin; on the curve at the base a very small lobule is placed.

Wing-membrane very broad, attached to the base of the toes, remarkably variegated with orange and rich brown-black. The portions of dark-coloured membrane are triangular in form, and occupy the spaces between the second and third and third and fourth fingers, and also the space included between the fourth finger and a line drawn between the carpus and the ankle. All the remaining portions of membrane, including the ears and interfemoral membrane, are orange. The orange-colour extends in narrow lines along each side of the fingers (the bones of which are of the same hue), and is dispersed over the dark triangular spaces in dots and streaks.

The fur of the head extends upon the face, forming a fringe along the margin of the upper lip; from the back it extends upon the humerus and antehumeral membrane, covering half the extent of the latter; on the wing-membrane it is confined to a narrow space along the sides of the body and terminates rather abruptly; behind, it passes on to the interfemoral membrane, covering nearly half its surface, and, leaving the posterior half of the interfemoral and calcanea bare, reappears on the back of the toes. Beneath, the fur of the thorax extends along the humerus to the elbow-joint, and as far as a line drawn from the elbow to the knee-joint the wing-membrane is covered with a few scattered hairs; behind, the fur of the abdomen extends upon the interfemoral membrane, rather densely at the root of the tail, but quickly thins out into a few very short scattered hairs, which extend over half its surface.

Dentition quite similar to that of *V. murinus*; the second upper premolar very small, and in many specimens difficult to distinguish even with the aid of a lens.

Length (of an adult ♀ preserved in alcohol), head and body 2″·4, tail 1″·9, head 0″·8, ear 0″·7, tragus 0″·35, forearm 1″·9, third finger 3″·3, fifth finger 2″·9, thumb 0″·45, tibia 0″·9, foot 0″·4.

Hab. Himalaya (Nipal, Darjiling); India (Chaibasa); Khasia hills; China (Shanghai, Kiang, Amoy); Island of Formosa.

a. ad. sk.*	Northern China.	Purchased.
b. ad. sk.	China.	Mr. Fortune [C.].
c, d. ♀ ad., al.	Island of Formosa.	R. Swinhoe, Esq. [C.].
e. ♂ ad., al. (type).	Nipal.	B. H. Hodgson, Esq. [P.].
f. ad. sk.	? India.	Dr. Falconer [P.].

27. Vespertilio insularum.

Ears slightly shorter than the head; inner margin of the ear-conch straight, or even slightly concave in the upper third, the tip narrowly but obtusely rounded off; the outer margin straight for nearly half its length beneath the tip, then abruptly and strongly convex, emarginate opposite the base of the tragus, and terminating in a very distinct small lobe: tragus rather long, straight, and subacutely pointed; the inner margin quite straight, the outer straight in the upper, convex in the lower half, with a round horizontal lobe at the base not succeeded by an emargination above (Plate XVIII. fig. 7, ear, enlarged).

Wings from the base of the toes; feet small and slender; calcaneum extending halfway between the ankle and the extremity of the tail; the last rudimentary caudal vertebra alone free.

Fur, above and beneath, black with light brown extremities; the tips of the hairs beneath paler than on the dorsal surface, extending slightly upon the membranes.

First and second upper premolars very small and internal to the tooth-row; the second lower premolar about three fourths the size of the first.

Length, head and body 1″·6, tail 1″·5, head 0″·65, ear 0″·6, tragus 0″·3, forearm 1″·4, thumb 0″·25, third finger 2″·3, fifth finger 1″·8, tibia 0″·65, calcaneum 0″·9, foot 0″·3.

Hab. Navigators' Islands.

This is the only species of the family *Vespertilionidæ* as yet obtained in Polynesia. It resembles *V. mystacinus* perhaps more closely than any other species, but is distinguished by its greater size, much more deeply emarginate ears and longer tragus, and by other characters enumerated in the description.

a. ad., al. (type).	Navigators' Islands.	Mr. Schmeltz [C.].

28. Vespertilio montivagus.

Vespertilio montivagus, *Dobson, Journ. Asiat. Soc. Bengal*, 1874, p. 237; *Monogr. Asiat. Chiropt.* p. 136, figs. *a, b, c* (1876).

Crown of the head slightly elevated; muzzle thick and obtuse. Ears narrow, tapering, with rounded tips; outer side flatly emarginate immediately beneath the tip for about quarter its length, then slightly convex, and, lower down, opposite the base of the tragus, with a small emargination, terminating beyond this in a small rounded lobe; inner margin convex for two thirds its length, then

* Specimen figured in P. Z. S. 1858, p. 82, pl. lx.

forming a straight line to the tip: tragus moderately long, acutely pointed; inner margin straight, outer slightly convex upwards, with a small rounded lobe at the base (Plate XIX. fig. 4, head, enlarged).

Tail wholly contained within the interfemoral membrane. Wings from the base of the toes.

Fur, above, dark brown, the extreme tips paler and shining; beneath, much darker, almost black for three fourths the length of the hairs, the remaining portion ashy. Above the face is densely covered, the long hairs concealing the eyes, but the anterior half of the muzzle is nearly naked; on each side of the muzzle two or three small glandular wart-like elevations may be seen through the hairs. The ears are quite naked anteriorly, posteriorly their bases only are covered. On the wing-membrane the fur of the back extends as far as a line drawn from the junction of the proximal and middle thirds of the humerus to the commencement of the distal third of the femur; on the interfemoral membrane it ceases abruptly at the end of the second caudal vertebra. Beneath, the fur extends upon the wing-membrane as far as a line drawn from the elbow to the knee-joint; the interfemoral membrane is covered at the root of the tail, and three fourths of the remaining part is very thinly clothed with the short hairs arising from the transverse dotted lines.

Incisors on each side parallel and acutely pointed; inner incisors longest, with a small acutely pointed talon near their extremities on the outer side. In the lower jaw the second premolar is small, but distinctly visible, standing in the tooth-row; in the upper jaw the space between the canine and third premolar is small, and the second premolar is very minute, placed interiorly, in the angle between the first and third premolar, and with difficulty distinguishable even with the aid of a lens.

Length, head and body 1″·8, tail 1″·6, head 0″·65, ear 0″·58, tragus 0″·25, forearm 1″·5, thumb 0″·25, third finger 2″·7, fifth finger 1″·9, tibia 0″·6, foot 0″·3.

Hab. Hotha, Yunan.

Type in the collection of the Indian Museum.

a. ad., al.	Hotha, Yunan.	Calcutta Museum [E.].

29. Vespertilio mystacinus.

Vespertilio mystacinus, *Leisler, Kuhl, Deutsch. Fledermm. Ann. Wetterau. Naturk.* iv. p. 55 (1819); *Desmarest, Mammalogie*, p. 140 (1820); *Bell, Brit. Quadrup.* p. 50 (1837), wdct.; *MacGillivray, Brit. Quadrup. (Nat. Libr.)* pp. 63, 90 (1838); *Temminck, Monogr. Mammal.* ii. p. 191 (1835–41); *Keys. & Blas. Wiegm. Archiv*, 1839, p. 310; *Wagner, Suppl. Schreb. Säugeth.* v. p. 725 (1855); *Blasius, Fauna Deutschl.* p. 96, figs. 64, 65 (1857); *Dobson, Monogr. Asiat. Chiropt.* p. 133 (1876).

Vespertilio siligorensis, *Hodgson, Horsfield, Ann. & Mag. Nat. Hist.* 1853, p. 102.

Muzzle narrow; skull vaulted, not much elevated above the face-line; glandular prominences on the face small. Ears as long as the

head; laid forwards the tips extend slightly beyond the end of the nose; internal basal lobe angular, the horizontal margin forming, with the ascending anterior margin, a right angle; lower third of inner margin of the conch faintly convex, middle third more strongly convex, upper third straight, tip rounded off; upper third of the outer margin deeply concave, lower half abruptly convex, with a distinct lobe at the base, separated by a slight emargination opposite the base of the tragus. Tragus narrowed above and subacutely pointed; inner margin straight or faintly concave; outer margin with a distinct rounded half-horizontal lobule at the base, succeeded by a concavity, above which and slightly above the base of the inner margin the tragus reaches its greatest width, thence upwards decreasingly convex to the tip (Plate XVIII. fig. 9, ear, enlarged).

Wings from the base of the toes; calcaneum terminating in a small projecting tooth; last rudimentary caudal vertebra free.

Fur above dark brown, with pale reddish-brown tips; beneath dark brown, the extremities of the hairs ashy.

The small glandular prominences of the face are clothed with long hairs; and the upper lip has a fringe of fine straight hairs.

The fur of the body extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the middle of the femur, and upon the interfemoral membrane as far as the end of the third caudal vertebra; beneath, the distribution of hair upon the wings is similar, but the interfemoral is covered only at the root of the tail.

The upper incisors are equal in vertical extent, their extremities strongly diverging. Both upper premolars are drawn inwards; the second very small, about half the size of the first, and about half its vertical extent; lower incisors next the canines much larger than the others.

Length, head and body 1″·5, tail 1″·4, head 0″·55, ear 0″·55, tragus 0″·3, forearm 1″·25, thumb 0″·25, third finger 2″·1, fifth finger 1″·6, tibia 0″·55, foot 0″·28.

Some specimens give somewhat larger measurements than these.

Hab. Palæarctic Region: Europe (from Finland to Spain; from Ireland to Middle Russia); in Asia hitherto found in Syria, at Pekin, and in the Himalayas only.

a. ♂ ad., al.	England.	
b, c. ad. ska.	Isle of Wight.	Rev. C. A. Bury [P.].
d. ad. sk.	Hastings.	
e. ad. sk.	Stratford-on-Avon.	R. F. Tomes, Esq. [P.]
f. ad. sk.	Sweden.	Stockholm Museum [P.].
g. ad. sk	Rio de la Luna, Spain.	
h, i. ♂ & ♀ ad., al.		M. Lidth de Jeude [C.].
j, k. ♂ ad., al.		
l. ♀ imm., al.	Pekin.	
m. ♀ ad., al.	Syria.	Purchased.
n, o. ♂ imm. & ♀ ad., al.	Nipal.	B. H. Hodgson, Esq. [P.].
p. skull.	England.	Mr. Yarrell's Coll.
q. skull.	Stratford-on-Avon.	R. F. Tomes, Esq.

30. Vespertilio muricola.

Vespertilio adversus, *Temminck* (*non Horsfield*), *Monogr. Mammal.* ii. p. 221; *Peters, MB. Akad. Berl.* 1866, p. 399; 1868, p. 626.
Vespertilio tralatitius, *Temm.* (*non Horsf.*) *l. c.* p. 228.
Vespertilio muricola, *Hodgson, J. A. S. B.* x. p. 908; *Gray, Cat. Mamm. Brit. Mus.* 1843, p. 26; *id. List of Mammalia and Birds of Nepaul presented by B. H. Hodgson, Esq., to the British Museum,* 1846; *Dobson, Monogr. Asiat. Chiropt.* p. 134 (1876).
Kerivoula trilatitoides, *Gray, Cat. Mamm. Brit. Mus.* 1843, p. 27 (*nomen nudum*) (*vide Peters, MB. Akad. Berl.* 1866, p. 399).
Vespertilio caliginosus, *Tomes, P. Z. S.* 1859, p. 73.
Vespertilio ater, *Bernstein, Peters, l. c.* 1866, p. 18.
Vespertilio (Pternopterus) lobipes, *Peters, l. c.* 1867, p. 706.
Vespertilio blanfordi, *Dobson, P. A. S. B.* 1871, p. 214.
Vespertilio moupinensis, *Alph. Milne-Edwards, Mammif. du Tibet,* p. 255, pl. xxxvii[a]. fig. 2, pl. xxxvii[c]. fig. 4 (1872).

Muzzle very similar to that of *V. mystacinus* in shape, but more obtuse in front, owing to the greater development of the glands of the muzzle, which are also less covered with hair; the outer margin of the ear is deeply concave beneath the tip, but the emargination does not extend so far down as in that species. Laid forwards the extremities of the ears scarcely extend beyond the end of the muzzle; internal basal lobe of the ear-conch angular, the ascending anterior margin straight immediately above the base, then faintly concave for a short distance, the middle third convex, the upper third straight, the tip narrowly round off; the outer margin deeply concave in the upper third, then abruptly convex, slightly emarginate opposite the base of the tragus, and terminating in a short, internally concave and marginally convex lobe. Tragus subacutely pointed; inner margin slightly concave, giving the tragus an inclination forwards and inwards; outer margin with a very distinct lobe at the base, succeeded by an angular emargination, above which the greatest breadth is soon attained, thence decreasingly convex to the tip (Plate XVIII. fig. 8, ear, enlarged)*.

Wings to the base of the toes; a small and rather variable post-calcaneal lobe; extreme tip of the tail alone projecting.

The distribution of the fur upon the wing-membranes is similar to that of *V. mystacinus*. On the lower surface of the interfemoral fine hairs arise from the transverse dotted lines on the greater part of its surface.

Above, black, the extreme tips of the hairs light yellowish brown; on the head and face black, with shining tips; beneath, black, with ashy extremities; specimens in colourless alcohol appear intensely black throughout.

The upper incisors on each side scarcely diverge so much as in *V. mystacinus*; the second shorter cusp of the inner incisor distinct, and placed rather near the base; second upper premolar slightly

* A specimen in the Leyden Museum from Sumatra has the upper third of the ear-conch remarkably narrow, and the tragus is also correspondingly attenuated. In other respects it does not differ from other examples of this species.

internal to the tooth-row, very small, and scarcely distinguishable without the aid of a lens.

Length (of the type specimen, an adult ♀), head and body 1″·75, tail 1″·5, ear 0″·55, tragus 0″·25, forearm 1″·35, thumb 0″·23, third finger 2″·25, fifth finger 1″·7, tibia 0″·6, foot 0″·3.

Hab. Himalaya (Sikhim; Láchung, 8000 feet; Simla; Dalhousie), Tibet, India (Chutia-Nagpur), Arracan (Akyab), Malay Peninsula, Sumatra, Java, Borneo, Celebes, Amboyna, and probably all the islands of the Malay Archipelago within the Oriental Region.

a. ♀ ad., al. (type).	Nipal.	B. H. Hodgson, Esq. [P.].
b. ♂ ad., al.	Nipal.	B. H. Hodgson, Esq. [P.].
c, d. ♂ & ♀ ad.	Himalayas.	W. T. Blanford, Esq. [C.].
(*Vespertilio blanfordi*, Dobson.)		
e, f. ♂ & ♀ ad., al.	Singapur.	Purchased.
g. ♂ ad., al.	Siam.	Mr. Mouhot [C.].
h–q. ♂ & ♀ ad., al.	Borneo.	Purchased.
r, s. ♂ juv. & ♀ ad., al.	Borneo.	Sir E. Belcher.
t. ad., al.	Java.	G. E. Dobson, M.B. [P.].
u, v. ad. sk.	Menado, N. Celebes.	A. R. Wallace, Esq.
w. ad. sk.	Solor Islands.	A. R. Wallace, Esq.
x. ad. sk. (Labelled "*Vespertilio tralatitius*, Tomes.")		
y. ad. sk. (Type of *Vespertilio trilatitoides*, Gray.)		

31. Vespertilio australis.

Slightly larger than *V. muricola*, which it resembles in the form of the muzzle and in the presence of a distinct postcalcaneal lobe; ears as in *V. mystacinus*, but the tragus is curved slightly outwards above, and its narrow extremity is rounded off. Tail nearly as long as the head and body, the extreme tip alone projecting; a narrow but distinct postcalcaneal lobe; wings from the base of the toes.

Fur remarkably short and dense, extending forwards upon the face in front of the eyes, but covering only a small portion of the wings along the sides of the body and the base of the large interfemoral membrane; beneath, the wing- and interfemoral membranes are scarcely more covered than upon the upper surface.

Above, brown, slightly paler towards the extremities of the hairs; beneath, the basal two thirds of the hairs are dark brown, almost black, the terminal third light brown.

Upper incisors nearly equal in cross section; the first and second upper premolars in the tooth-row, the second very small, but quite visible from without.

Length, head and body about 1″·8, tail 1″·5, ear 0″·6, tragus 0″·28, forearm 1″·55, thumb 0″·28; third finger—metacarp. 1″·4, 1st ph. 0″·48, 2nd ph. 0″·75; fifth finger—metacarp. 1″·4, 1st ph. 0″·35, 2nd ph. 0″·3; tibia 0″·6, foot 0″·32.

Hab. Australia (New South Wales).

Type in the collection of the Leyden Museum.

This species may be at once distinguished from all closely allied species by the peculiar shortness of the fur, and by the outward

curvature of the tragus. The shape of the tragus agrees with that of the species of the group of which *V. emarginatus* may be considered typical; but the form of the ear-conch, the presence of a postcalcaneal lobe, and other characters induce me to place it next *V. muricola*.

New-World Species.

V. mystacinus may be considered typical of all the known New-World species of this subgenus, which differ from one another very slightly, *V. evotis* and *V. polythrix* being the only forms which may be said to stand by themselves, and even these resemble *V. mystacinus* in many respects.

Moreover there appears to be a strong tendency to variability within certain limits, so that certain individuals of a species often depart considerably in the form of the ears, in the colour of the fur, and in other respects from the type of that species.

The discrimination of the American species is therefore very difficult, and this difficulty is much increased by the small number of specimens available for examination in museums (see remarks at end of this genus, p. 329).

32. Vespertilio nitidus.

Vespertilio nitidus, *Allen, Proc. Acad. Sci. Philad.* 1862, p. 247; *Monogr. Bats of N. America* (1864), p. 60.

Ears very similar in shape to those of *V. mystacinus*, the outer margin similarly deeply angularly emarginate, the only difference, apparently, being that the inner margin is more convex in its middle third, and the ear is thus proportionately wider. Muzzle long and narrow, depressed as in *V. mystacinus* between the inner margin of the ears; the crown of the head slightly and abruptly vaulted behind (Plate XIX. fig. 7, ear, enlarged).

Thumb very short, with a feeble claw. Feet small; wings to the base of the toes; calcaneum long, ending in a small projecting lobule. The extreme tip of the tail alone projecting.

Fur long and dense, extending thickly upon the face to within a short distance from the end of the muzzle, but covering the wing-membrane along the sides of the body only. The fur of the back extends backwards upon the base of the interfemoral to the end of the third caudal vertebra, and laterally in a band, very thinly, internal to the tibia on each side almost to the ankle. Beneath, the wing-membrane is clothed to a slightly greater extent than on the upper surface, and about three fourths of the surface of the interfemoral is dotted with short, fine, thinly spread hairs ranged along the transverse dotted lines.

Fur, above, dark with reddish-brown tips; beneath, similar, with ashy extremities, the light-coloured extremities of the hairs contrasting strongly with their dark bases.

Dentition quite the same as in *V. mystacinus*.

Length (of an app. adult ♂ preserved in spirit), head and body 1″·5, tail 1″·4, head 0″·58, ear 0″·58, tragus 0″·26, forearm 1″·2, thumb 0″·18, third finger 2″, fifth finger 1″·5, tibia 0″·5, foot 0″·25.

This species appears to be the representative of *V. mystacinus* in North America, agreeing with that species in size, in the shape of the head and ears, and in dentition, but distinguished from it by the remarkably short thumb and smaller feet.

Hab. North America west of the Rocky Mountains; California; Texas.

a, b. ♂ ad., al.	N. America.	Smithsonian Institute [P.].
c. ad. sk.	Mexico.	Purchased.

33. Vespertilio nigricans.

Vespertilio nigricans, *Wied, Beitr. Naturgesch Brasil.* Bd. ii. p. 266 (1826).

Vespertilio parvulus, *Temminck, Monogr. Mammal.* ii. p. 246 (1835–41).

About the same size as *V. nitidus*, but with smaller ears, shorter muzzle, a larger thumb, and much darker fur. Crown of the head abruptly and rather considerably raised above the face-line. Ears shorter than the head, and narrow; laid forwards the tips do not quite extend as far as the end of the nose; internal basal lobe slightly rounded, its horizontal margin meeting the ascending inner margin of the ear at a right angle; middle third of the inner margin convex, upper third straight; tip shortly rounded off, projecting outwards, owing to the deep and abrupt concavity beneath occupying rather more than one third of the outer margin; middle third of outer margin abruptly convex, then flatly emarginate opposite the base of the tragus; lower third terminating in a distinct convex lobe. Tragus much attenuated in upper one fourth and acutely pointed; inner margin slightly concave; outer convex, very faintly so in upper part; a very distinct rounded lobule at the base of the outer margin, succeeded by an emargination, shortly above which the tragus reaches its greatest width (Plate XIX. fig. 9, ear, enlarged).

Thumb moderate, with a well-developed claw; feet small; wings to the base of the toes. Tail wholly included within the interfemoral membrane. Termination of calcaneum indistinct.

On the upper surface the face is nearly naked about the eyes and in front of the ears, but the glandular prominences between the eyes and the nostrils are covered with long straight hairs; the fur of the back extends to a very limited degree upon the wings, and upon the interfemoral triangularly as far as the end of the third caudal vertebra; the sides of the membrane close to the legs are quite naked. Beneath, the wing-membrane is thinly covered almost as far as a line drawn from the elbow to the knee-joint; the fur of the abdomen extends but to the root of the tail, the remainder of the interfemoral is covered thinly with very fine, almost invisible hairs. Above, very dark brown, slightly reddish brown towards the extremities of the hairs; beneath similar, the extremities paler.

The following Table shows the relative measurements of three specimens preserved in alcohol.

	Length, head and body.	tail.	head.	ear.	tragus.	forearm.	thumb.	third finger.	fifth finger.	tibia.	foot.	Sex.
		"	"	"	"	"	"	"	"	"	"	
Interior of Brazil.	1·65	1·5	0·6	0·55	0·3	1·35	0·2	2·35	1·7	0·55	0·28	♀
Ecuador.....	1·6	1·35	0·6	0·5	0·25	1·3	0·25	2·2	1·65	0·55	0·25	♀
West Indies	1·8?	1·4	0·6	0·5	0·25	1·3	0·25	2·2	1·65	0·55	0·25	♀

The specimens from Ecuador and the West Indies have the head apparently less elevated, and the internal basal lobe of the ear more rounded than in the specimen from Brazil, from which the above description has been taken, otherwise they resemble it very closely.

Hab. Mexican and Brazilian Subregions.

I have examined the type of *Vespertilio parvulus*, Temminck, in the Leyden Museum, and believe it to be identical with *V. nigricans*, Wied. The above description has been taken from a specimen in alcohol which I had compared directly with the type.

a. ♀ ad., al.	West Indies.	
b. ♂ imm., al.	Dueñas, Guatemala.	O. Salvin, Esq. [C.].
c. ♀ ad., al.	Venezuela.	Mr. Fraser [C.].
d. ad. sk.	Bogota, Columbia.	
e. ♀ ad., al.	Ecuador.	Mr. Bollaert [C.].
f. ad. sk.	Pernambuco.	J. P. G. Smith, Esq. [P.].
g. ♀ ad., al.	Interior of Brazil.	Purchased.
h. imm. sk.	Rio de Janeiro.	Voy. of the 'Rattlesnake.'
i–k. ad. sks.	Bolivia.	Mr. Bridges [C.].
l. ad. sk.		Zool. Soc. Coll.

34. Vespertilio oxyotus.

Vespertilio oxyotus, *Peters, MB. Akad. Berl.* 1866, p. 20.

The following is a translation of Dr. Peters's description of this species, which is represented by a single specimen in the collection of the Munich Museum:—

The ears have four to five indistinct transverse folds, and laid forwards their extremities extend beyond the end of the muzzle. The upper third of the inner margin of the ear-conch is slightly concave, the outer margin is also concave above and towards the middle, so that, although the extremity is rounded off, the ear appears pointed. Tragus half as long as the ear, very acutely pointed,

inner margin straight, outer margin slightly concave above, indistinctly toothed above, the rounded lobule at the base convex, not attenuated. Nostrils separated by a space equal in width to double their transverse diameter. The whole face, as far as the naked extremity of the nose, thickly covered with hair.

The two upper incisors on each side are separated from the canines by a space equal to the transverse diameter of the base of the outer incisor. The inner incisor is half as thick again as the outer, and has a small basal cusp externally and posteriorly; the first and second upper premolars stand in the tooth-row.

Wings from the base of the toes; metacarpal bone of the fifth finger slightly longer than that of the fourth; above, the wing-membrane along the sides of the body and the basal fourth of the interfemoral is clothed with hair; beneath, the wing-membrane is similarly but less densely covered as far as a line drawn from the elbow to the second fourth of the tibia. Tail as long as the head and body, of eleven vertebræ, whereof the last very short one projects. Sole of the foot broad and without transverse elevations. The cartilaginous calcaneum extends halfway between the heel and the extremity of the tail, and has a narrow cutaneous margin behind its basal half.

Fur uniform dark brown above; beneath, the base of the hairs is dark brown, the extremities brownish white.

Length, head and body 1″·8, tail 1″·8, head 0″·65, ear 0″·65 × 0″·3, tragus 0″·3, forearm 1″·6, thumb 0″·3; third finger—metacarp. 1″·4, 1st. ph. 0″·46, 2nd ph. 0″·65; fifth finger—metacarp. 1″·3, 1st ph. 0″·37, 2nd ph. 0″·32; tibia 0″·65, foot 0″·24.

Hab. South America (Chimborazo, at 9000 to 10000 feet).

Dr. Peters remarks that, "from the above description, this species may be readily distinguished from its allies *V. subulatus*, *yumanensis*, and *affinis*. In none of these species are the ears so pointed, and in none has the tragus this form. *V. affinis*, which resembles it most in the colour of the fur, has quite a different tragus. Of the hitherto described South-American species, *V. polythrix*, Is. Geoffr., which I have not sufficiently compared with it, may stand nearest to it."

35. Vespertilio polythrix.

Vespertilio polythrix, *Is. Geoffroy, Annal. des Sci. Natur.* t. iii. p. 443 (1824); *Temminck, Monogr. Mammal.* ii. p. 248 (1835–41); *Wagner, Suppl. Schreb. Säugeth.* i. p. 535, v. p. 758 (1844–55).

Ears as in *V. mystacinus*, but narrower above, and the lower half of the outer margin is less convex; the tragus is slightly curved outwards above, the muzzle is thicker and shorter, and the distance between the orbits greater.

Wings from the base of the toes or close thereto; extreme tip of the tail projecting.

Fur not long, but peculiarly dense and woolly, extending as thickly upon the muzzle as upon the crown of the head, and leaving

the extremity of the nose alone uncovered. On the upper surface the wing-membrane is covered as far as a line drawn from the middle of the humerus to the knee-joint, terminating by a well-defined margin; and the interfemoral in a similar manner about as far as the end of the third caudal vertebra; beneath, the wing-membrane is clothed as far as the elbow, but the interfemoral is naked except at the root of the tail.

Fur above deep brownish chestnut; beneath similar, with a greyish tinge; the base of the hairs on both surfaces dark.

Second upper premolar slightly internal.

Length, head and body about 2″, tail 1″·3, ear 0″·6, tragus 0″·25, forearm 1″·55, thumb 0″·25, third finger 2″·4, fifth finger 1″·9, tibia 0″·65, foot 0″·35.

Hab. Brazil.

This species is at once distinguished by its very peculiar dense woolly fur, which covers the face as thickly as the other parts of the body.

a. ad. sk.	Pernambuco.	J. P. G. Smith, Esq. [P.].
b. ad. sk.	Brazil.	Mr. Brandt [C.].
c. ad. sk.		Earl of Derby [P.].

36. Vespertilio chiloënsis.

Vespertilio chiloënsis, *Waterh. Zool. 'Beagle,'* i. p. 5; *Wagner, Suppl. Schreb. Säugeth.* i. p. 537, v. p. 753.

Muzzle narrow and conical; glandular prominences between the eyes and nostrils forming raised ridges enclosing a triangular concave space on the face behind the nostrils. Ears long, laid forwards the tips extend to the end of the muzzle or slightly beyond it; internal basal lobe angular in front, its horizontal margin joining the ascending inner margin of the ear slightly under a right angle; lower third of inner margin straight, middle third convex, upper third straight, tip of ear shortly rounded off; upper half of the outer margin deeply concave, lower half convex, emarginate opposite the base of the tragus, terminating beyond this and opposite base of inner margin in a small convex lobe. Tragus moderately long and subacute; inner margin straight; at the base of the outer margin a rounded lobe, placed obliquely, from which the outer margin curves slightly outwards and upwards, and attains its greatest convexity slightly above the base of the inner margin, thence decreasingly convex upwards, and straight in its upper third.

Wings to the base of the toes; a narrow but distinct postcalcaneal lobule; calcaneum terminating in a small projecting tooth; last rudimentary vertebra of tail free; tail as long as the head and body.

The sides of the face are covered with a few long hairs, and the mouth is margined by a dense fringe of fine straight hairs. The fur of the body extends upon the wing-membrane on the upper surface as far as a line drawn from the middle of the humerus to the knee, upon the interfemoral membrane as far as the end of the third caudal vertebra in the centre, and, laterally, as far as the end

of the proximal third of the tibia. Beneath, the fur extends thinly as far as a line drawn between the elbow- and knee-joints, but the base only of the interfemoral membrane has a few short fine hairs.

Above dark brown at the base, becoming lighter towards the extremities; beneath black at the base of the hairs, the terminal third ashy.

The dentition is quite similar to that of *V. mystacinus*. Length (of an adult ♀ preserved in alcohol), head and body 1″·6, tail 1″·65, head 0″·6, ear 0″·6, tragus 0″·3, forearm 1″·45, thumb 0″·25, third finger 2″·3, fifth finger 1″·8, tibia 0″·65, foot 0″·35.

Hab. South America: Chili; Isle of Chiloe; Mendoça.

This species resembles *V. mystacinus* in the form of the ear-conch and tragus and in the colour of the fur. It is distinguished by its larger size, proportionately much longer tail (which equals the combined length of the head and body), less convexity of lower half of outer margin of the ear, and prominent ridges on the sides of the muzzle formed by the glandular prominences.

a. im. ♂, al.	Chili.	Purchased.
b, c. imm. sks.	Chili.	Purchased.
d. ad. ♀, al.	Mendoça, S. America.	Purchased.

37. Vespertilio levis.

Vespertilio levis, *Is. Geoffroy, Ann. des Sci. Natur.* t. iii. p. 444 (1824).

Muzzle rather broad, but not short, the sides of the face from the eye to the nose and to the margin of the lip smooth; crown of the head slightly and somewhat abruptly vaulted above the face-line; ears longer than the head, laid forwards the extremities project about one tenth of an inch beyond the end of the muzzle; horizontal portion of the internal basal lobe of the ear-conch short, joining the ascending portion under a right angle; lower one third of the ascending part of the inner margin straight or slightly concave, middle third convex, upper third straight, the tip very narrowly rounded off; nearly the upper half of the outer margin unevenly concave beneath the tip, which projects very slightly outwards, becoming gradually convex in the lower half, forming near its termination a very distinct small convex lobe; tragus moderately long, attenuated in its upper third, and slightly inclined outwards (Plate XIX. fig. 6, head, enlarged).

Wings from the base of the toes; calcaneum terminating in a small projecting lobule; free margin of the interfemoral membrane between the ends of the calcanea fimbriated as in *V. nattereri*, and fringed with a few very fine short hairs; tip of the tail projecting.

Teeth as in *V. mystacinus*.

Length (of a ♂ preserved in alcohol), head and body 1″·85, tail 0″·6, head 0″·65, ear 0″·7, tragus 0″·3, forearm 1″·5, thumb 0″·3, third finger 2″·4, fifth finger 1″·9, tibia 0″·6, calcaneum 0″·7, foot 0″·35.

Hab. S. America (Brazil, Uruguay).
Type in the collection of the Paris Muséum.

a. ♂ ad., al.	Uruguay.	Thomas Havers, Esq. [P.].

38. Vespertilio evotis.

Vespertilio evotis, *Allen, Monogr. Bats N. America*, p. 48, figs. 42, 43 (1864).

Ears very large, laid forwards they extend 0″·35 beyond the end of the muzzle; the inner margin of the ear-conch is regularly convex, the tip shortly rounded off, the outer margin slightly concave in upper third, then convex, emarginate opposite the base of the tragus, and terminating in a distinct rounded lobe: tragus very long, acutely pointed, tapering from the middle upwards, and inclined outwards; inner margin convex, outer margin convex in lower half, concave above.

Wings from the base of the toes; last caudal vertebra and half the antepenultimate vertebra free.

The fur of the body extends very slightly upon the membranes. The inferior surface of the interfemoral membrane has a few fine hairs at the base of the tail only.

Fur above dark at the base, the extremities of the hairs light yellowish brown; beneath also dark at the base, but the extremities are white.

Second upper premolar in the tooth-row nearer to the first than to the third premolar, from which it is separated by a slight interval; first and second lower premolars similar; lower incisors crowded.

Length (of an adult ♂), head and body 1″·7, tail 1″·6, head 0″·7, ear 0″·85, tragus 0″·45, forearm 1″·45, thumb 0″·35; third finger—metacarp. 1″·3, 1st ph. 0″·45, 2nd ph. 0″·7; fifth finger—metacarp. 1″·15, 1st ph. 0″·35, 2nd ph. 0″·4; tibia 0″·65, foot 0″·33.

Hab. North America west of the Rocky Mountains.

a. ad. sk.	California.	Purchased.
b. ♀ ad., al.	East Oregon.	H. N. Moseley, Esq. [P.].

(Found amongst rocks on Deschutes River, near Camp Polk.)

39. Vespertilio subulatus.

Vespertilio subulatus, *Say, Long's Expedition to the Rocky Mountains*, ii. p. 65 (1823); *Cooper, Ann. Lyc. New York*, iv. p. 61 (1837); *Wagner, Suppl. Schreb. Säugeth.* i. p. 532, v. p. 750; *Lecomte, Proc. Acad. Nat. Sci. Philad.* 1855, p. 436; *Allen, Monogr. Bats N. America*, p. 51, figs. 45, 46 (1864).

? Vespertilio californicus, *Bachman, Journ. Acad. Philad. Nat. Sci.* 1842, p. 436; *Peale, United States Expl. Exped.* p. 3 (1858).

Ears broad, nearly as long as the head; inner margin of the ear-conch regularly and rather strongly convex, the basal lobe short, angular, and narrowly rounded off at the angle, the tip broadly rounded off, not projecting outwards, the upper half of the outer margin straight, becoming convex about the middle, terminating in

front of the base of the tragus in a very distinct small thickened lobe; tragus long, attenuated, and acutely pointed, outer margin slightly concave above, inner margin correspondingly convex, so that the tragus inclines outwards (Plate XIX. fig. 10, ear, enlarged).

Feet large; wings from the base of the toes; calcaneum short, the last caudal vertebra free.

Above black, the hairs with light brownish-yellow extremities; beneath dark at the base, the terminal one fourth of the hairs yellowish white.

Above and beneath the fur of the body extends upon the wing-membranes nearly as far as a line drawn from the middle of the humerus to the knee-joint; above, the base of the interfemoral only is covered; beneath, a few fine hairs appear on the proximal half chiefly along the tail.

Teeth as in *V. mystacinus*.

Length, head and body 1″·7, tail 1″·4, head 0″·6, ear 0″·65, tragus 0″·33, forearm 1″·35, thumb 0″·3, third finger 2″·2, fifth finger 1″·8, tibia 0″·6, foot 0″·35.

Other specimens vary in being slightly larger or slightly smaller.

Hab. North (and probably Central) America; according to Allen, not found west of the Rocky Mountains.

This species approaches *V. mystacinus*, but not so closely as *V. nitidus*. The ears are larger, and the outer margin of the ear-conch not deeply emarginate above; the feet are also larger, and the last caudal vertebra is free.

a. ad. sk.	Malden, Canada.	P. W. Maclagan, Esq. [P.].
b. ♂ ad., al.	North America.	Zool. Soc. Collection.
c. ad. sk., in al.		Smithsonian Institute [P.].
d. skull of *a*.		

40. Vespertilio carolii.

Vespertilio carolii, *Temminck, Monogr. Mammal.* ii. p. 237 (1835–41).

Head scarcely elevated above the face-line; glandular prominences between the eyes and nostrils rather more developed upwards than in most species of the genus, resembling in this respect *V. levis*; they do not add to the breadth of the muzzle, nor cause a concavity between them on the face; extremity of the muzzle projecting slightly beyond the lower lip in front. Ears somewhat shorter than the head; laid forwards the tips extend exactly as far as the end of the nose; the internal basal lobe acute in front, the horizontal margin joining the ascending margin slightly under a right angle; the inner margin of the ear regularly convex from the base upwards, except quite near the tip, where it is straight; tip obtusely rounded off, projecting slightly outwards; beneath the tip nearly half the outer margin is slightly concave, then convex, distinctly concave opposite the base of the tragus, and terminating in a small convex lobe. The shape of the ear is similar to that of *V. mystacinus*, but the lower half of the outer margin is less convex. Tragus narrow, attenuated in its upper third, which inclines

slightly outwards; inner margin straight below, slightly convex above; outer margin with a distinct horizontal lobule at its base, then convex, attaining its greatest convexity slightly above the base of the inner margin; upper third concave.

Wings to the metatarsus; feet large and strong; interfemoral membrane acutely angular behind as in *V. capaccini*; last caudal vertebra and half the antepenultimate vertebra free; calcaneum long, extending three fourths the distance between the ankle and tip of the tail.

Above, the fur extends upon the wing-membranes as far as a line drawn from the middle of the humerus almost as far as the knee-joint; the base only of the interfemoral is covered, and a few hairs appear on the backs of the toes. Beneath, the wing-membrane is clothed to a slightly greater extent, and the greater part of the interfemoral, especially along the tail and inside the legs on each side, is covered with fine short whitish hairs.

Above dark brown, with sienna-brown tips; beneath black, with whitish extremities.

Length, head and body 1″·8, tail 1″·3, ear 0″·5, tragus 0″·28, forearm 1″·3, thumb 0″·25, third finger 2″ (metacarp. 1″·15), fifth finger 1″·7 (metacarp. 1″·1), tibia 0″·6, foot 0″·35.

Hab. North America.

a. ad. sk. N.W. America.

41. Vespertilio albescens.

Vespertilio albescens, *Geoffroy, Ann. du Mus.* viii. p. 204; *Temminck, Monogr. Mammal.* ii. p. 244 (1840) (vide *Peters, MB. Akad. Berl.* 1866, p. 19).
Vespertilio leucogaster, *Wied, Beitr. Naturg. Brasil.* ii. p. 271 (1825).
Vespertilio nubilus, *Wagner, Suppl. Schreb. Säugeth.* i. p. 534 (1844).

Muzzle rather long and thick; crown of the head scarcely elevated. Ears shorter than the head; laid forwards the tips do not reach to the end of the muzzle; the horizontal margin of the inner basal lobe of the ear straight, forming a right angle with the ascending portion of the outer margin, which is straight for nearly two thirds its length, then slants upwards and backwards; tip very narrowly rounded off; the upper half of the outer side flatly emarginate, so that the upper third of the ear is abruptly narrowed, but the tip does not project outwards; lower half gradually convex, with a very faint angular emargination opposite the base of the tragus terminating in a small, slightly convex lobe. Tragus long and subacutely pointed, attaining its greatest width slightly below the middle of the inner margin; the outer margin convex upwards for two thirds its length, then faintly concave; inner margin correspondingly convex above. Although the inner margin is more convex than straight, the tragus is scarcely inclined outwards, and in some specimens (as in that from which the accompanying illustration of the form of the ear was taken) the inner margin is concave, and the tragus consequently inclined inwards. (Plate XIX. fig. 8, ear, enlarged.)

Wings from the metatarsi close to the base of the toes; feet rather large; toes scarcely more than half the length of the feet; calcaneum feeble, termination indistinct; tail as long as the head and body; the last rudimentary caudal vertebra and half the antepenultimate vertebra free.

Above dark brown, the extremities of the hairs on the shoulders and back shining yellowish; beneath similar, with ashy extremities.

On the upper surface the fur of the body extends upon the membranes along the sides of the body only, and upon the base of the interfemoral between the thighs; beneath, it extends thinly upon the wings nearly as far as a line drawn from the elbow to the knee, and the interfemoral is covered with long hair about the root of the tail, and half the remainder with very short fine hairs.

The upper canine and third premolar are separated by a narrow interval, and in the adult animal the *first and second small premolars are quite internal to the tooth-row*; the third premolar is large and exceeds the molars considerably in vertical extent; the lower premolars are also small, but they stand in the tooth-row; the third premolar nearly equals the canine in vertical extent.

Length (of an adult ♀ preserved in spirits), head and body 1″·7, tail 1″·8, head 0″·7, ear 0″·6, tragus 0″·3, forearm 1″·75, thumb 0″·28, third finger 2″·7, fifth finger 2″·1, tibia 0″·7, foot 0″·35.

This species is distinguished especially by its peculiarly thick, not broad muzzle, by the great length of the forearm in comparison to the length of the body, and (in fully adult specimens) by the narrow space between the canine and third premolar and consequent displacement inwards of both the first and second minute upper premolars.

Hab. Ecuador; Central America (Guatemala); Brazil (banks of the Mucuri River).

The above description has been taken from a specimen which agrees in all respects with the type of this species, and also with the types of *V. leucogaster*, Wied, in the Leyden Museum. The extremity of the tail is described by the Prince of Neuwied as but half a line free; but in the types it varies from this length to one and a half lines, the last caudal vertebra and half the antepenultimate vertebra being free in one specimen. In the specimens preserved in alcohol in the British Museum, which I have identified with this species, the length of the free portion of the tail varies considerably. The extremely small size and internal position of the second upper premolar (in adult specimens) no doubt caused the Prince of Neuweid to overlook it.

a. ♀ ad., al.	Ecuador.	Mr. Fraser's Coll.
b. ♂ juv., al.	Ecuador.	Mr. Fraser's Coll.
c–h. ♂ & ♀ sks., in al.	Cuidad Vieja, Guatemala.	O. Salvin, Esq. [C.].
i. ad. sk.	N. America (?).	Mr. Drumond [P.].
j. ♂? ad., al.	Tehuantepec.	Mr. Boucard [C.].

(Smaller, and with tragus more incurved.)

42. Vespertilio arsinoë.

Vespertilio arsinoë, *Temminck, Monogr. Mammal.* ii. p. 247 (1835–1841).

Appears to be quite intermediate between *V. nigricans* and *V. albescens*, resembling the former in the shape of its ears and in size, the latter in the form of the tragus, in the larger feet, free extremity of the tail, and in the peculiar colour of the fur. Ears shorter than the head; laid forwards their extremities do not reach the end of the muzzle; inner margin of the conch convex, outer margin concave in upper half, becoming gradually convex in the lower half; tip rounded off, slightly projecting outwards: tragus rather short and straight, subacutely pointed, not attenuated towards the tip.

Wings from the base of the toes; feet intermediate in size between those of *V. nigricans* and *V. albescens*; calcaneum terminating in a projecting tooth; the last osseous caudal vertebra free.

Fur very similar in surface colour to that of *V. albescens*, but darker above, the hairs being almost black, the extreme tips on the shoulders and back shining yellowish; beneath, dark brown or black at the base and for three fourths the length of the hairs, the terminal fourth of the hairs on the chest and abdomen, and the terminal half of the fur about the pubis and thighs, ashy.

Both the first and second upper premolars stand in the tooth-row, and the second is visible from without.

Length (of the type specimen), head and body about 1″·7, tail 1″·3, ear 0″·5, tragus 0″·25, forearm 1″·35, thumb 0″·28, third finger—metacarp. 1″·25, 1st ph. 0″·48, 2nd ph. 0″·7; fifth finger—metacarp. 1″·15, 1st ph. 0″·35, 2nd ph. 0″·25; tibia 0″·6, foot 0″·3.

Hab. Surinam. Type in the collection of the Leyden Museum.

43. Vespertilio lucifugus.

Vespertilio lucifugus, *Leconte, Cuvier, Anim. Kingd.* (ed. *M'Murtrie*), i. Append. p. 431 (1831); *Allen, Monogr. Bats N. America*, p. 55, figs. 51, 52 (1864).

Vespertilio brevirostris, *Wied, Verz. beobach. Säugeth. N.-America*, p. 19 (1862).

Vespertilio affinis *et* yumanensis, *Allen, Monogr. Bats N. America*, pp. 53 & 58, figs. 49, 55 (1864).

Head slightly and abruptly elevated, forehead depressed; glandular prominences of the sides of the face rather largely developed laterally, causing the muzzle to appear obtuse in front. Ears shorter than the head; laid forwards the tips extend within a short distance from the end of the muzzle; lower third of the inner margin faintly concave, the upper two thirds convex, the tip evenly rounded off continuously with the convexity of the inner margin; upper third of the outer margin slightly concave, the tip scarcely projecting, the middle third becoming gradually and very slightly convex. Tragus rather short and acutely pointed; inner margin

straight, outer slightly convex below, attaining its greatest convexity slightly above the base of the inner margin; the upper third straight, slanting to the tip. (Plate XIX. fig. 11, ear, enlarged.)

Wing-membranes from the metatarsus close to the base of the toes; feet rather large. Interfemoral membrane between the ends of the calcanea acutely angular; last vertebra and half the antepenultimate vertebra of the tail free.

Above, the fur of the back extends to a short distance only upon the wing-membranes, and upon the interfemoral as far as the end of the second caudal vertebra. Beneath, the wing-membrane is thinly covered as far as from the elbow to the knee; and the greater part of the interfemoral has short fine hairs scattered over it.

Fur, above and beneath black or dark brown at the base, pale brown above, the terminal third of the hairs beneath ashy. Ears, wing-membranes, and integuments dark brown throughout.

The dentition presents no peculiarities.

Length, head and body 1″·65, tail 1″·5, head 0″·65, ear 0″·55, tragus 0″·25, forearm 1″·4, thumb 0″·28, third finger 2″·6, fifth finger 1″·9, tibia 0″·55, foot 0″·35.

Other specimens give slightly larger or smaller measurements; the above have been taken from a ♀ with *fœtus in utero*.

Hab. Nearctic and Neotropical Regions; according to Allen, universally distributed throughout the United States.

I am unable to find in Dr. Allen's descriptions of *V. affinis* and *V. yumanensis* any characters sufficient to distinguish them from *V. lucifugus*. The internal basal lobe of the ear, said by Dr. Allen to be obtuse in *V. lucifugus*, does not differ sufficiently in the specimens of this species, received by the British Museum from the Smithsonian Institute, from that of the other species of the genus to permit of its shape being used as a distinguishing character.

a. ♂ ad., al.	Newfoundland.	H. Reeks, Esq. [P.].
b, c. ad. sk.	North America (lat. 49°, long. 119°).	
d. ♀ ad., al.	Lake Winnipeg.	Sir J. Richardson [P.].
e. ♀ ad., al.	North America.	Smithsonian Institute.
f. ♂ ad., al.	America.	Mr. Douglass's Coll.
g. ♂ ad., al.	Interior of Brazil.	Purchased.
h, i. ♂ & ♀ ad., al.	America.	Zool. Soc. [P.].

In the 'Proceedings' of the Academy of Natural Sciences of Philadelphia for August 1866, Dr. H. Allen has described eight (?) new species of this genus from tropical America, arranging them into two groups, thus:—

a. Interfemoral membrane relatively small; each joint of tail a third shorter than each of *β*; terminal joint of tail exserted. Colour of membranes and auricle blackish. 1. *V. mundus*; 2. *V. concinnus*; 3. *V. exiguus*; 4. *V. obscurus*.

β. Interfemoral membrane relatively large; each joint of tail a third longer than each of *a*; terminal joint not exserted (a small tip of cartilage may be exserted); colour of membranes and ear light brown, excepting *V. exilis*. 5. *V. agilis*; 6. *V. volans*; 7. *V. exilis*; 8. *V. tenuidorsalis*.

Dr. Allen remarks that he was obliged to describe these species without having had an opportunity of examining the types of the species described by European zoologists from the same region. It is therefore very probable that most, if not all of the above are synonymic terms; but I find it quite impossible to say from the descriptions of what species they are synonyms, or whether some or all should be recognised as new. In most of the descriptions the leading characters are derived from the colours of the fur, which appear to be scarcely less variable in this genus than in other genera of Chiroptera, and therefore cannot be depended upon in distinguishing species.

13. KERIVOULA.

Kerivoula, *Gray, Ann. & Mag. Nat. Hist.* vol. x. p. 258 (1842); *Tomes, P. Z. S.* 1858, p. 322; *Dobson, Monogr. Asiat. Chiropt.* p. 145 (1876).

Muzzle narrow, elongated; skull very concave between the nasal bones and the vertex, so that the crown of the head appears considerably vaulted; glandular prominences between the eyes and nostrils very small, indistinct, the upper surface of the muzzle sloping down evenly, laterally and in front, to the margin of the lip; aperture of nostril completely circular, opening sublaterally close to the margin of the upper lip; mouth wide, upper and lower lips projecting slightly, the upper lip and the angle of the mouth thickly fringed with long hairs: ears funnel-shaped owing to the great convexity of their outer margins, diaphanous, studded with glandular papillæ from which minute hairs arise; the outer margin terminating very abruptly by a deep lobe not separated from the outer side of the ear, and not carried forwards to the angle of the mouth; tragus extremely long and narrow and very acutely pointed, straight or slightly curved outwards: integumentary system largely developed; anterior margin of the deep antebrachial membrane free throughout; wings from the base of the toes; calcaneum long and strong, *curved backwards*, no postcalcaneal lobe; posterior margin of the interfemoral membrane more or less fringed with hairs; *tail as long as or longer than the head and body*, wholly contained within the interfemoral membrane.

Dentition. Inc. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3\ 3}$, m. $\frac{3-3}{3-3}$.

Upper incisors parallel, not divergent as in *Vespertilio*; the outer incisor always shorter than the inner one, sometimes minute; second upper premolar slightly smaller than the third, *never minute as in Vespertilio*; second lower premolar equal to or slightly larger than the first, and nearly or quite equal to the third.

This genus includes some of the most delicately formed and most truly insectivorous, tropical, forest-haunting Bats. They are distin-

guished from *Vespertilio* (with which they agree in the number of the teeth) not by any single character, but by a series of characters in which they closely resemble each other and differ from all other forms.

Range. Ethiopian, Oriental, and Australian Regions (Austro-Malayan Subregion).

Synopsis of the Species.

a. Outer margin of the tragus *without* a lobule at the base, but with a more or less distinct process opposite the base of the inner margin, *not* succeeded by an emargination immediately above or beneath.
  a'. Outer upper incisors equal to or exceeding half the length of the inner incisors; inner incisors with a postero-external cusp.
    a''. Wing-membranes variegated with orange and black.
      a'''. Margin of the interfemoral membrane with a well-developed comb-like fringe.
        α. Ears shorter than the head; fur orange; forearm 1″·4 ..... 1. *K. picta*, p. 332.
    b''. Wing-membranes unicoloured.
      a'''. Margin of the interfemoral membrane with a well-developed comb-like fringe.
        β. Ears shorter than the head; fur brown; forearm 1″·3 or slightly more ..... 2. *K. brunnea*, p. 334.
      b'''. Margin of the interfemoral with a few fine hairs.
        γ. Ears as long as the head; fur greyish brown; forearm 1″·1..... 3. *K. africana*, p .335.
  b'. Outer upper incisors short, sometimes minute, never equalling half the length of the inner incisors; inner incisors with or without a small basal cusp posteriorly.
    b''. Wing-membranes unicoloured.
      c'''. Margin of the interfemoral membrane naked.
        δ. Ears shorter than the head; outer upper incisors nearly half the length of the inner incisors (in immature individuals); fur darker at the base, paler at the extremities; forearm 1″·4 ..... 4. *K. hardwickii*, p. 335.
      d'''. Margin of the interfemoral membrane fringed with short rather stiff hairs.
        ε. Ears shorter than the head; outer upper incisors minute; fur darker

at the extremities than at the base; forearm 1″·7 ..... 5. *K. papillosa*, p. 337.

ζ. Ears longer than the head; outer incisors as in *K. papillosa*; forearm 1″·25 ..... 6. *K. pellucida*, p. 337.

b. Outer margin of the tragus with a distinct lobule at the base as in *Vespertilio*, succeeded immediately above, opposite the base of the inner margin, by an emargination.

b′. Outer upper incisor on each side minute, scarcely exceeding the cingulum of the inner incisor in vertical extent.

b″. Wing-membranes unicoloured.

b‴. Margin of the interfemoral membrane naked; forearms and thumbs also naked.

η. Ears shorter than the head, outer margin of the ear-conch with a second small concavity about the middle; fur as in *K. hardwickii*; forearm 1″·55 ..... 7. *K. jagorii*, p. 338.

c‴. Margin of the interfemoral fringed; forearms, thumbs, and tibiæ clothed with short appressed hairs.

θ. Margin of the interfemoral with a few fine hairs; ears as long as the head; fur brown, with shining yellow extremities; forearm 1″·45 8. *K. papuensis*, p. 339.

ι. Margin of the interfemoral with short bristly hairs; ears shorter than the head; fur tricoloured, with bronze-yellow extremities; forearm 1″·45 ..... 9. *K. ærosa*, p. 339.

c′. Outer upper incisors nearly as long as the inner incisors; inner incisors with a small posterior basal cusp.

d‴. Margin of the interfemoral membrane with a comb-like fringe, as in *K. picta*; forearms, thumbs, and tibiæ clothed with short appressed hairs.

κ. Ears shorter than the head; forearm 1″·4 ..... 10. *K. lanosa*, p. 340.

1. Kerivoula picta.

Vespertilio pictum, *Pallas, Spicil. Zoolog.* fasc. iii. p. 7.

Vespertilio pictus, *Schreb. Säugeth.* i. p. 170 (1775); *Gmel. Linn. Syst. Natur.* p. 49 (1788); *Geoffroy, Ann. du Mus.* viii. p. 199 (1806); *Desmarest, Mammalogie*, p. 141 (1820); *Horsf. Zool. Research. Java* (1825); *Temm. Monogr. Mamm.* ii. p. 223 (1835–41); *Wagner, Suppl. Schreb. Säugeth.* v. p. 736.

Vespertilio kirivoula, *F. Cuvier, Nouv. Annal. du Muséum*, t. i. p. 9 (1832).

Kerivoula picta, *Gray, Ann. & Mag. Nat. Hist.* x. p. 258 (1842);

Kelaart, Prodr. Faunæ Zeylanicæ, p. 25 (1852); *Tomes, P. Z. S.* 1858, p. 325; *Dobson, Monogr. Asiat. Chiropt.* p. 146 (1876).
Vespertilio (Kirivoula) pictus, *Horsfield, Cat. Mamm. Mus. E.I. Comp.* p. 40 (1851).

Ears moderate; laid forwards the tips reach midway between the eyes and the end of the muzzle; inner side very convex forwards; the lower half of the inner margin sloping forwards and upwards so as to overhang the eye, the upper half upwards and backwards to the tip, which is short and subacute; immediately beneath the tip the outer margin is shortly but deeply concave, the remaining four fifths of the outer side of the conch much expanded outwards and forwards, and terminating abruptly midway between the base of the tragus and the angle of the mouth by a sudden inward curvature of the outer margin. Tragus very long and straight, extending almost as high as the base of the emargination on the outer side of the ear beneath the tip; inner margin straight; no lobe at base of outer margin, but a distinct tooth-like projection opposite the base of the inner margin, from which the outer margin slopes straight upwards to the very acute tip.

Thumb short; wings to the base of the toes. Fur above deep orange; beneath paler. The ears, antebrachial, and interfemoral membranes of the same deep orange colour; the wing-membrane between the humerus and the posterior limb, the free margin of the membrane between the foot and the fifth finger, along the posterior side of the forearm, and on both sides of each finger, deep orange; the remaining parts deep black with scattered orange dots, especially on the membrane between the metacarpal bones of the third and fourth fingers. Both the inner and outer surfaces of the ear-conch are thickly covered with small papillæ from which fine hairs arise. A dense tuft of long hairs springs from the angle of the mouth, and extends half the length of the upper lip; face naked directly in front of the eyes and for a space around the eyes. On the upper surface the wing-membrane is thinly covered with long hairs as far as a line drawn from the middle of the humerus to the knee-joint; the same kind of hairs extend upon the thighs and tibiæ and cover the interfemoral thinly as far as a line drawn between the ankles; the backs of the feet to the base of the claws are densely covered with short fine orange-coloured fur, which also forms a thick short fringe along the posterior margin of the calcanea and interfemoral membrane.

Inner upper incisors long, in vertical extent nearly equal to three fourths of the canine, acutely pointed, with a small second basal cusp posteriorly and externally; outer incisor unicuspidate, slanting slightly inwards and forwards towards the posterior cusp of the inner incisor, which it nearly or quite equals in vertical extent. First and second upper premolars distinct, the second slightly internal and separated from the third by a small space. Lower incisors not crowded, distinctly trifid. Lower premolars nearly equal in size.

Length, head and body 1″·55, tail 1″·6, head 0″·65, ear 0″·6, tragus 0″·3, forearm 1″·4, thumb 0″·22, third finger 2″·9, fifth finger 2″·1, tibia 0″·55, foot 0″·3.

Hab. Peninsula of India; Ceylon; Burma; Sumatra; Java. Probably distributed generally throughout the Oriental Region.

The very peculiar markings of the membranes of *K. picta* at once distinguishes it from all other known species of the genus, but it also differs in the much narrower and more pointed muzzle, and in the form and position of the upper inner incisors, which are remarkably large, much curved forwards, and are placed so much in front of the canines that the outer incisors lie almost directly behind them.

a. ad. sk.	Ceylon.	Dr. Kelaart.
b. ♂ ad., al.	Ceylon.	Purchased.
c–e. ad. sk.	Java.	E.I. House Collection.
f. ♂ ad., al.	Java.	J. Bowring, Esq.
g–k. ad. sks.		E.I. House Collection.
l. ♀ ad., al.		M. Lidth de Jeude.
m, n. imm. sks.	No history.	
o. skeleton.	Ceylon.	Purchased.

2. Kerivoula brunnea.

Ears slightly shorter than the head, laid forwards the extremities do not extend quite to the end of the muzzle; ear-conch very similar in outline to that of *K. picta*; tragus with a slight indication of a lobe at the base of the outer margin, which, however, is not succeeded by an emargination, and the projection opposite the base of the inner margin is obtuse.

Fur, above, yellowish brown, the basal half of the hairs very dark brown or black; beneath paler or greyish brown, the base of the hairs also dark-coloured; very long and dense, covering nearly half the upper surface of the interfemoral membrane, and extending along the legs to the backs of the feet; the posterior margin of the interfemoral membrane has a comb-like fringe of curved hairs of equal length, as in *K. picta* and *K. lanosa*. Membranes dark brown.

Upper incisors nearly equal in length and in cross section, the inner incisor on each side with a small postero-external basal cusp visible from the front; of the lower incisors the outer on each side has a blunt cusp rising considerably above the others; second upper premolar slightly smaller than the first, with a more oblique cusp inclined forwards.

Length (of a not full-grown ♂), head and body 1″·5, tail 1″·9, head 0″·55, ear 0″·5, tragus 0″·35, forearm 1″·3, thumb 0″·25; third finger—metacarp. 1″·25, 1st ph. 0″·65, 2nd ph. 0″·8; fifth finger—metacarp. 1″·2, 1st ph. 0″·4, 2nd ph. 0″·3; tibia 0″·55, foot 0″·3.

Hab. Uncertain.

This species is at once distinguished by the very dark colour of its fur, by the comb-like fringe along the interfemoral membrane behind, and by the large size of the upper outer incisors.

The type specimen has suffered from long soaking in weak alcohol, which has denuded it of much of its fur, and it is possible that the anterior extremities may have had short hairs clothing them as in *K. lanosa*, especially as some hairs are found still adhering to the outer margin of one wing.

a. ♂ (not full-grown), al. Madras or South Africa. Sir A. Smith [P.].

3. Kerivoula africana.

Ears and tragus almost quite similar to those of *K. hardwickii*, but longer than the head; thumb shorter; wings from the base of the toes.

The fur extends upon the base only of the interfemoral membrane and along the legs to the backs of the feet; a few fine hairs extend along the calcanea and margin of the interfemoral membrane, but not so thickly as to form a fringe. The face is nearly naked between the eyes, but long hairs arise from the glandular eminences in front, and also form a fringe along the margin of the lips.

On the upper surface the fur is dark brown at the base, the extremities greyish brown; beneath similar, but paler.

Inner upper incisor on each side long, with a distinct outer cusp; outer incisor unicuspidate, exceeding the outer cusp of the inner incisor, and nearly equalling that tooth in vertical extent. First upper premolar smaller than the third and equal to the second premolar; lower premolars equal.

Length (of the type, a ♂, preserved in alcohol), head and body 1″·35, tail 1″·35, head 0″·5, ear 0″·5, tragus 0″·3, forearm 1″·1, thumb 0″·2, third finger 2″·15, fifth finger 1″·6, tibia 0″·45, calcaneum 0″·5, foot 0″·25.

Hab. East coast of Africa (Zanzibar).

Type in the collection of the Paris Museum.

This is the smallest species of *Kerivoula* as yet described. It resembles *K. hardwickii* very closely in general form, but may be at once distinguished by the upper incisors.

4. Kerivoula hardwickii.

Vespertilio hardwickii, *Horsfield, Zool. Researches in Java* (1825); *Temm. Monogr. Mammal.* ii. p. 222 (1841); *Wagner, Suppl. Schreb. Säugeth.* v. p. 736 (1855); *Dobson, Monogr. Asiat. Chiropt.* p. 148, figs. *a*, *b*, *c* (1876).

Kerivoula hardwickii, *Gray, A. & M. N. H.* x. p. 258 (1842).

Kerivoula fusca, *Dobson, P. A. S. B.* 1871, p. 215.

About the same size as *K. picta*, from which it is at once distinguished by the almost uniform colour of the fur and membranes. Ears larger than those of that species; laid forwards the tips extend nearly to the end of the muzzle; the inner margin forms almost a regular arc of a small circle from the base to the tip; the tips are rounded, and immediately beneath them is a short but deep concavity occupying the upper fourth of the outer margin; below this

the outer side of the conch becomes much expanded, and projects forwards anteriorly even more than in *K. picta*, the outer margin curving inwards and backwards towards the base of the tragus to its termination. Tragus very long (extending in some specimens quite to the edge of the emargination below the tip on the outer side of the ear) and much attenuated; the inner margin straight; the outer with a small projecting tooth opposite the base of the inner margin, where the tragus reaches its greatest width, above this slightly convex, the upper two thirds faintly concave. Conch covered with glandular papillæ and small hairs arising from them, as in *K. picta*. (Plate XVII. fig. 6.)

Thumb large, armed with a strong claw (much larger than in *K. picta*). Wings to the base of the toes, or between the base of the toes and the claws. Posterior margin of the interfemoral membrane with numerous small conical projections, not distinct in dried skins. On the upper surface the membranes are almost naked; a few long scattered hairs appear upon the interfemoral membrane and upon the backs of the legs; but the feet are almost naked, and the interfemoral has a few short straight hairs along its posterior margin, not densely fringed as in *K. picta*. Beneath, a few thinly spread hairs appear upon the wing-membrane between the humerus and femur; but the integument is nearly quite naked. Chin and throat clothed with remarkably long and dense fur.

Fur, above and beneath, dark at the base and for half its length, the terminal half shining greyish brown.

The upper inner incisors have no second posterior cusp, but an indistinct tubercle on their outer sides near their summits; the outer incisors, which are about half their length, lie close to them, and have a small external basal cusp. First upper premolar equal to the third in vertical extent, but less than it in cross section; second premolar about one third smaller, close between the first and third premolar, not separated from the third premolar by an interval. Lower premolars equal in size and equal to the first molar in vertical extent.

Length (of an adult ♂), head and body 1″·5, tail 1″·7, head 0″·6, ear 0″·5, forearm 1″·4, thumb 0″·33; third finger—metacarp. 1″·4, 1st ph. 0″·6, 2nd ph. 0″·85; fifth finger—metacarp. 1″·35, 1st ph. 0″·38, 2nd ph. 0″·4; tibia 0″·65, foot 0″·3.

Hab. Peninsula of India (Sibsagar, Assam; Shillong, Khasia Hills); Camboja; Java; Borneo; Duke of York Island.

Type in the collection of the E. I. Comp. at South Kensington.

A specimen from Duke of York Island differs from typical examples of this species from the Oriental Region in being slightly larger, the forearm measuring quite 1¼ inch, and in having no trace of a tubercle on the outer side of the upper outer incisors. In all other respects it is not distinguishable from Indian specimens of this species.

a, *b*. imm. et ad. sks.	India.	T. C. Jerdon, Esq.
c–*e*. ♂ & 2 ♀ ad., al.	Camboja.	
f. ♀ ad., al.	North Borneo.	Purchased.
g. ♀ ad., al.	Duke of York Island.	
h. ♀ ad., al.		M. Lidth de Jeude.

5. Kerivoula papillosa.

Vespertilio papillosus, *Temminck, Monogr. Mammal.* ii. p. 220 (1835–41); *Wagner, Suppl. Schreb. Säugeth.* v. p. 736 (1855).
Kerivoula papillosa, *Dobson, Monogr. Asiat. Chiropt.* p. 150 (1876).

Ears very similar in shape to those of *K. hardwickii*, but the anterior part of the outer side of the conch does not project so far forwards; the tragus has also a small tooth on its outer margin, which in its lower half is regularly slightly convex; laid forwards the tips of the ears extend to the end of the muzzle.

The upper lip has a dense fringe of hair extending almost as far as the nasal apertures on each side.

Wings from the base of the claws; thumbs and feet large, armed with very large and strong claws; free edge of the interfemoral membrane margined with small papillæ and short hairs.

Fur, above, light shining brown, with darker tips; beneath paler.

The upper inner incisors are comparatively shorter than in *K. hardwickii*, the outer incisors scarcely visible. Dentition in other respects similar to that of *K. hardwickii*.

The following measurements have been taken by me from the type specimen preserved in the Leyden Museum:—

Length, head and body 2″·2, tail 2″·2, ear 0″·65, forearm 1″·7, third finger 3″·6, fifth finger 2″·6, tibia 0″·9, calcaneum 0″·8, foot 0″·4.

The above measurements show that this species much exceeds in size all the preceding.

Hab. Java.

Type in the collection of the Leyden Museum.

This species is closely related to *K. hardwickii*, from which it is chiefly distinguished by its very much greater size, by the smallness of the outer upper incisors, and by the colour of the fur.

a. nearly ad. sk., in al. No history.

6. Kerivoula pellucida.

Vespertilio pellucidus, *Waterhouse, P. Z. S.* 1845, p. 6; *Wagner, Suppl. Schreb. Säugeth.* v. p. 742 (1855).
Kerivoula hardwickii, *Tomes, P. Z. S.* 1858, p. 329.
Kerivoula pellucida, *Dobson, Monogr. Asiat. Chiropt.* p. 149 (1876).

About the size of *K. hardwickii*, but the ears are conspicuously much larger, laid forwards the tips extend one fifth of an inch beyond the end of the nose; the inner margin is regularly convex from the base to the tip, the most anterior part of the convexity of the inner margin projects forwards almost as far as the end of the muzzle; the upper third of the outer margin is occupied by a broad obtusely angular emargination, very different from the short concavity beneath the tip in *K. hardwickii*; the lower two thirds of the outer margin is much expanded, and similar to the same part of the ear in *K. picta*. Tragus similar in shape to that of *K. hard-*

wickii, but not so much attenuated, nor, proportionately to the size of the ear, so long; the projection on the outer margin, opposite the base of the inner margin, is also very slight and obtuse (Plate XVII. fig. 7).

Wings to the base of the toes; posterior margin of the interfemoral fringed with short hairs, but not papillated.

Distribution of the fur upon the wing- and interfemoral membranes as in *K. hardwickii*.

Upper inner incisors unicuspidate, *very long and slender*; outer incisor on each side very short, less than one third the inner incisor in vertical extent, broad at the base, its summit sloping inwards towards and lying against the base of the inner incisor. Lower incisors slightly crowded; the two central incisors with four distinct cusps each, those on each side with three, whilst those next the canines have a small cusp on their inner sides only. Upper premolars as in *K. hardwickii*; lower premolars equal, and nearly equal to the first molar in vertical extent.

Length (of an adult ♂ preserved in alcohol), head and body 1″·65, tail 2″, head 0″·6, ear 0″·7, tragus 0″·35, forearm 1″·25, thumb 0″·3, third finger 2″·9, fifth finger 2″, tibia 0″·7, foot 0″·3.

Hab. Philippine Islands.

This species was united by Mr. Tomes with *K. hardwickii*, but the very much longer and quite differently shaped ears at once distinguish it.

a, *b*. ♀ juv. et ad., al. (type) Philippine Islands. Zool. Soc. Coll.

7. Kerivoula jagorii.

Vespertilio (Kerivoula) jagorii, *Peters*, *MB. Akad. Berl.* 1866, p. 399; *Dobson*, *Monogr. Asiat. Chiropt.* p. 185 (1876).

Ears as in *K. hardwickii*; but there is a second slight concavity about the middle of the outer margin; inner margin very convex, projecting beyond the eye: tragus rather broad below, tapering to an acute point and curved outwards; immediately above the base a deep but narrow horizontal slit opposite the base of the inner margin. Nostrils close together, the extremity of the muzzle projecting.

Tip of the tail projecting slightly; margin of the interfemoral membrane not fringed with hairs; wing-membrane from the base of the toes. Fur similar in colour to that of *K. hardwickii*.

Upper inner incisor long and unicuspidate; outer incisor very short, not half the length of the inner incisor; upper premolars nearly equal in vertical extent.

Length, head and body 1″·95, tail 1″·9, head 0″·75, ear 0″·6, tragus 0″·4, forearm 1″·55, thumb 0″·37, third finger 3″·2, fifth finger 2″·25, tibia 0″·65, foot 0″·35.

Hab. Philippine Islands (Samar Island).

Type in the collection of the Berlin Museum.

8. Kerivoula papuensis.

Slightly larger than *K. lanosa*; ears as in *K. hardwickii*; no second emargination on the outer side of the ear-conch, but the tragus has a distinct rounded lobe at the base of its outer margin, which is succeeded by a horizontal notch opposite the base of its inner margin, not so deep as in *K. jagorii*.

Fur, above, dark brown, the terminal fourth of the hairs shining yellow; beneath, paler brown, the extreme tips shining grey. On the upper surface the humerus is naked in its distal half, but the forearm is clothed with short appressed golden-yellow hairs, which also cover the thumb to the base of the claw and extend outwards along the second finger and upon the distal half of the middle finger; the wing- and interfemoral membranes are nearly naked, but the tail and the feet are clothed like the forearm, and a few hairs appear upon the legs; the posterior margin of the interfemoral has a few fine hairs forming a thin fringe; beneath, the membranes and extremities are almost quite naked.

Upper inner incisors long and unicuspidate, outer incisors on each side very short, scarcely exceeding the cingulum of the inner incisor; all the lower incisors trifid and at right angles to the direction of the jaws; the incisors near the canines nearly as wide as the others, very different in shape from those of *K. hardwickii*; first upper premolar exceeding the second in vertical extent, but rather less than it in cross section at the base, and as long or nearly as long as the third premolar, which exceeds both teeth in transverse diameter.

Length, head and body about 1″·8, tail 1″·8, head 0″·7, ear 0″·65, tragus 0″·4, forearm 1″·5, thumb 0″·35; third finger—metacarp. 1″·45, 1st ph. 0″·65, 2nd ph. 1″; fifth finger—metacarp. 1″·4, 1st ph. 0″·45, 2nd ph. 0″·4; tibia 0″·65, foot 0″·35.

Hab. New Guinea.

a. ad. sk. (type). Port Moresby, New Guinea. Rev. W. Y. Turner, M.D. [C.].

9. Kerivoula serosa.

Kerivoula serosa, *Tomes, P. Z. S.* 1858, p. 333.

Ears rounded above, with a shallow emargination occupying the upper third of the outer margin of the ear-conch; tragus long, tapering, and acutely pointed.

Face moderately hairy; the side of the face, between the eye and the ear, and the chin nearly naked. The fur of the back does not extend upon the membranes, but the upper surfaces of the legs, feet, and heel-cartilages, of the tail, forearms, thumbs, and index fingers, and of the two terminal phalanges of the longest fingers are more or less clothed with short appressed shining hairs, thickest on the forearms and tail. The margin of the interfemoral membrane between the extremities of the calcanea and tail is sparingly furnished with

short bristly hairs, very unlike the thick comb-like fringe of *K. lanosa*.

The fur of all the upper parts is long, thick, and curly, and nearly uniform in colour over the whole of the back, varying only in becoming a little darker behind. The hairs are dark grey-brown at their bases and for three fourths their length, succeeded by yellowish brown, then by umber-brown, their extremities bronze-yellow, and this latter colour only prevails in the short hairs covering the extremities. Beneath, the fur is dark sepia-brown, tipped with brownish bronze.

Upper inner incisors long and pointed; outer incisors very small, scarcely visible without the aid of a lens. Upper canines long, strong, and angular; first upper premolar also long and acutely pointed.

Length, head and body about 2″, tail 1″·7, head 0″·7, ear 0″·6, tragus 0″·35, forearm 1″·45, thumb 0″·35, third finger 2″·85, fifth finger 2″·1, tibia 0″·6, foot 0″·35.

Hab. South Africa, eastern coast.

This species is known only from Mr. Tomes's description, from which the above has been taken.

10. Kerivoula lanosa.

Vespertilio lanosus, *Smith, Illustr. Zoology S. Africa*, pl. 50.
Kerivoula lanosa, *Tomes, P. Z. S.* 1858, p. 331.
? Kerivoula argentata, *Tomes, P. Z. S.* 1861, p. 32.
Nycticejus nidicola, *Kirk, P. Z. S.* 1864, p. 650.

Ears quite similar to those of *K. picta*, with the following exceptions:—The outer margin, in addition to the concavity beneath the tip, has a very small but distinct notch about the middle, and at the base internally, between the termination of the outer margin and the tragus, a small fleshy tooth-like elevation is placed, concealing the lobe at the base of the tragus (Plate XVII. figs. 5, 5 *a*).

Tragus long, tapering, and very acutely pointed, as in *K. picta*, but a small circular lobe exists at the base of the outer margin, succeeded by an emargination which is bounded above by a projection from which the outer margin slopes evenly to the tip.

Fur, above, dark brown at the base, then yellowish brown with reddish-brown tips; beneath, very pale yellowish brown or dirty white.

On the upper surface the wing-membrane is covered with long thinly-spread hairs as far as a line drawn from the middle of the humerus to the knee; the forearm and the thumb are covered with very short shining yellow hairs; about half the interfemoral membrane is clothed with long hairs, which also extend along the legs to the backs of the feet, where, however, they become short and are more densely set; the remaining half of the interfemoral is quite naked, but the posterior margin of the calcaneum and margin of the interfemoral membrane on each side of the tail are edged with closely

set straight parallel short hairs, forming a comb-like fringe. Beneath, the wing-membrane is clothed with very fine rather long hairs as far as a line joining the elbow- and knee-joints; the remainder of the membrane is naked, except where a few very short, almost invisible hairs arise from the transverse dotted lines.

Upper incisors slender and very acutely pointed; the inner incisors not so much curved forwards as in *K. picta*, with a minute basal cusp posteriorly not visible from without; outer incisor unicuspidate, nearly as long as the inner incisor; first and second upper premolars smaller in proportion to the other teeth than in other species of the genus, the second premolar less than the first in cross section at the base.

Length (of an adult ♂), head and body 1″·7, tail 2″, head 0″·65, ear 0″·5, tragus 0″·3, forearm 1″·4, thumb 0″·35, third finger 3″·2, fifth finger 2″·2, tibia 0″·6, calcaneum 0″·8, foot 0″·35.

Hab. S.E. Africa (Shupanga, near the Zambesi River; east coast of Cape Colony).

Dr. Kirk found a colony of this species inhabiting the hanging nests of Weaver-birds at Shupanga.

a, b, c. ♂ & 2 ♀ ad., al. Shupanga, Zambesi. Dr. Kirk [C.].
(Type of *Nycticejus nidicola*, Kirk.)

Under the name of *Kerivoula argentata* Mr. Tomes has described (P. Z. S. 1861, p. 32) a species from Otjoro, S.W. Africa, which, judging from the description, appears to be an example of an old individual of *K. lanosa* or, at most, a local variety of that species. The ears and tragus, the distribution of the fur and the teeth, are quite as in *K. lanosa*, the only differences being that the single specimen on which Mr. Tomes has founded his species has the forearm one tenth of an inch longer, and the extreme tips of the fur are of a "shining and silvery white."

14. NATALUS.

Natalus, *Gray, Mag. Zool. & Bot.* ii. p. 496 (1838); *Tomes, P. Z. S.* 1856, p. 176.

Nyctiellus, *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 84 (1855).

Spectrellum, *Gervais, Comptes Rendus de l'Acad. des Sciences*, 1856, p. 547.

Muzzle elongated, the crown of the head considerably elevated above the concave forehead; upper surface of the muzzle sloping down evenly on all sides to the margin of the lip; nasal apertures oval, close together, opening near the margin of the lip; lower lip broad, reflected outwards in front; ears funnel-shaped, the surface of the conch studded with glandular papillæ as in *Kerivoula*, the outer margin terminating abruptly between the tragus and the angle of the mouth; tragus short, more or less triangular in outline; thumb very short, nearly wholly enclosed in the antebrachial mem-

brane; wing- and interfemoral membranes much developed, with numerous dotted lines; wing-membranes from the inferior surface of the lower end of the tibia and from the base of the calcaneum; tail very long, wholly enclosed in the interfemoral membrane; calcanea convex backwards as in *Kerivoula*; no postcalcaneal lobe.

Dentition. Inc. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{3-3}{3-3}$.

Upper incisors in pairs, separated from the canines and also in front, the inner incisors diverging slightly from the outer ones as in *Vespertilio*; first and second premolars in both jaws well developed.

Range. Neotropical Region (Antillean, Mexican, and Brazilian Subregions).

This genus is evidently the representative of *Kerivoula* in the New World. In the general form of the head and ears, of the wing- and interfemoral membranes, and even in the teeth, it approaches that genus closely; but the much greater elevation of the crown of the head, the remarkable shortness of the thumb, the peculiar form of the tragus, the mode of attachment of the wing-membrane to the hinder extremities, and the position and form of the upper incisors distinguish it at once from all other genera of Vespertilionidæ, and even indicate its affinity to some of the genera of Emballonuridæ.

Synopsis of the Species.

a. Tragus broad at the base, narrow and pointed above; forearm 1″·5 ..... 1. *N. stramineus*, p. 342.

b. Tragus narrow opposite the base of its inner margin, expanded above; forearm 1″·05 .. 2. *N. lepidus*, p. 344.

1. Natalus stramineus.

Natalus stramineus, *Gray, Mag. Zool. & Bot.* ii. p. 496 (1838); *Tomes, P. Z. S.* 1856, p. 178, pl. xliii.

? Vespertilio splendidus, *Wagner, Wiegm. Archiv*, 1845, p. 148; *Abhandl. Münch. Akad.* v. p. 208.

Head long, forehead concave, so that the crown of the head appears to be considerably raised above the face-line; nostrils forming a rounded ridge along the centre of the upper surface of the muzzle in front, from which the sides of the face slope evenly down towards the upper lip on each side; nasal apertures close together, oval, opening downwards and forwards; lower lip broad, reflected outwards in front, with a central groove and a broad naked horizontal cushion on each side occupying a space extending outwards and backwards slightly beyond the lower canine. Ears shorter than the head, funnel-shaped; inner margin of the ear-conch very convex, projecting forwards more than halfway between the eye and the extremity of the muzzle; at the junction of the outer and inner margins a short triangular elevation narrowly rounded off forms the tip, outer margin ending abruptly midway between the base of the tragus and the angle

of the mouth: tragus broad at the base, abruptly narrowed above and acutely pointed, the upper half twisted inwards and forwards, so that more than half the inner margin is directed forwards; lower half of the outer margin very convex, the front and outer surface clothed with a few long straight hairs (Plate XVII. fig. 8).

Thumb very short, with a feeble claw, nearly wholly enclosed in the antebrachial membrane; tibia remarkably long and slender; calcaneum convex backwards as in *Kerivoula*, very long, termination indistinct; tail much longer than the head and body, the extreme tip alone projecting; wing-membrane attached across the end of the tibia and ankle-joint to the interfemoral membrane and base of the calcaneum; membranes exceedingly thin, almost transparent, traversed by numerous dotted lines.

Fur, above, light brownish yellow; beneath, similar but paler. Membranes nearly naked; a few very fine short hairs extend along the tail and form a fringe along the free margin of the interfemoral membrane; on the face long hairs extend from the ears forwards below the eyes to the small glands on the sides of the muzzle, forming a deep fringe along the upper lip.

Upper incisors short, in pairs, separated from the canines and also in front, placed in a line across the space between the canines; outer incisor, on each side, exceeding the inner in cross section at the base, but equal to it in vertical extent, both incisors unicuspidate; lower incisors minute, not crowded, placed in the direction of the jaws; first and second upper premolars about three fourths the size of the third premolar, the second premolar nearer to the first than to the third; lower premolars equal in size, and in vertical extent equalling the first molar.

(For measurements, see Table on next page.)

Hab. Brazil; Central America.

a. ♂ ad., al.	Brazil.
b. ad. sk.	South America.

Var. *a*.

In a specimen from Dueñas, Guatemala, collected by Mr. Salvin, the ears are smaller and less pointed, the muzzle narrower, and the wings attached to the tibiæ higher up than in the typical example of *N. stramineus*. The wing-membrane becomes adherent to the under surface of the tibia at the commencement of the distal third of the tibia, and a band then extends across a much wider angle to the calcaneum; the colour of the fur is also much darker, being dark reddish-brown above, slightly paler beneath, the extreme tip of the hairs somewhat ashy. The measurements are also different, as may be seen in the Table on next page; but in the absence of other specimens, I hesitate to describe it as the type of a distinct species.

a. ♂ ad., al.	Dueñas, Guatemala.	O. Salvin, Esq. [C.].

	N. straminens.	Var. *a.*
Length, head and body	1·75	1·9
„ tail	1·95	1·9
„ head	0·7	0·7
„ ear	0·6	0·55
„ tragus	0·18	0·18
„ forearm	1·5	1·6
„ thumb	0·15	0·2
„ third finger, metacarpal	1·3	1·35
„ „ „ 1st phalanx	0·6	0·55
„ „ „ 2nd „	0·95	1·0
„ fourth „ metacarpal	1·25	1·35
„ „ „ 1st phalanx	0·38	0·35
„ „ „ 2nd „	0·4	0·5
„ fifth „ metacarpal	1·25	1·45
„ „ „ 1st phalanx	0·4	0·4
„ „ „ 2nd „	0·4	0·4
„ tibia	0·75	0·8
„ foot	0·35	0·4

2. Natalus lepidus.

Vespertilio lepidus, *Gervais, Ramon de la Sagra, Hist. de l'île de Cuba*, p. 22, pl. i. figs. 1–4 (1838).
Vespertilio barbatus, *Gundlach, Wiegm. Archiv*, 1840, p. 356.
Nyctiellus lepidus, *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 84 (1855).
Spectrellum macrurum, *Gervais, Comptes Rendus de l'Acad. des Sciences*, 1856, p. 547.

Considerably smaller than *N. straminea*, but with similarly shaped muzzle and ears. The inner side of the ear-conch is very convex forwards, reaching more than halfway between the eye and the end of the muzzle; the tip is shortly rounded off, and the upper half of the outer margin is deeply concave, the lower half convex: tragus in form like an equilateral triangle with the base uppermost, its narrowest portion being opposite the base of its inner margin, its broadest above; the upper and inner angle projects inwards so that the inner margin of the tragus is concave above; the front surface is very concave.

Thumb very short; wings attached higher up than in *N. straminens* to the inner sides of the inferior surface of the tibia; calcaneum feeble, termination not distinct. Fur as in *N. straminens*, but darker.

Outer upper incisors on each side separated by a considerable space from the canine, blunt, directed almost vertically downwards; inner incisor slanting much inwards so as to approach very closely its fellow of the opposite side; lower incisors extremely small, in the direction of the jaws; first upper premolar very small, the second more than double its size, but not half the size of the third premolar, from which it is separated by a wide interval above, owing to the

projecting cingulum of the latter tooth; first lower premolar about half the size of the second, which equals the third in vertical extent.

Length, forearm 1″·05, thumb 0″·12, third finger 2″, fifth finger 1″·25, tibia 0″·4.

Hab. Cuba.

15. THYROPTERA.

Thyroptera, *Spix, Simiar. et Vespert. Bresil.* p. 61 (1823).
Hyonycteris, *Lichtenstein et Peters, MB. Akad. Berl.* 1854, p. 335; *Tomes, P. Z. S.* 1856, p. 178.

Muzzle elongated, slender; crown of the head considerably elevated above the concave forehead; nasal apertures circular, rather wide apart; ears funnel-shaped, the outer margin terminating between the base of the tragus and the angle of the mouth; *base of the thumbs and soles of the feet* (in the single species) *with hollow suctorial disks*; second finger rudimentary; middle finger with *three* phalanges; wings from the *base of the claws*; toes equal, of *two* phalanges each; tail produced to the hinder margin of the interfemoral membrane and beyond it.

Dentition. Inc. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{3-3}{3-3}$.

Upper incisors in pairs, as in *Vesperugo*, but separated from the canines as well as in front; premolars well developed in both jaws, as in *Natalus*.

Range. The Neotropical Region (Brazilian Subregion).

1. Thyroptera tricolor.

Thyroptera tricolor, *Spix, Simiar. et Vespert. Bresil.* p. 61, pl. xxxvi. fig. ix. (1823); *Dobson, P. Z. S.* 1876, pp. 531–4, pl. lv. figs. 4–6 (thumb, foot, and calcaneum).
Thyroptera bicolor, *Cantraine, Bull. de l'Acad. Bruxell.* xii. p. 489 (1845).
Hyonycteris discifera, *Lichtenstein et Peters, MB. Akad. Berl.* 1854, p. 335.
Hyonycteris discifera *et* albiventer, *Tomes, P. Z. S.* 1856, p. 179.

Ears shorter than the head, funnel-shaped, with short subacute tips; inner margin of the ear-conch convex, much less so than the outer, which in its lower two thirds is strongly convex, ending abruptly about midway between the base of the tragus and the angle of the mouth, but on a lower level, its upper third deeply concave; tragus short, with a prominent lobule opposite the base of its inner margin directed forwards, abruptly narrowed in upper third, very acutely pointed and curved inwards. The extremity of the muzzle projects, and the space between the nasal orifices is occupied by a deep pit, bounded by a rounded fleshy process above and beneath; lower lip with a central triangular naked cushion cut off by a groove on either side.

Thumb with a well-developed claw; and on its inferior surface, from the base of the first phalanx, and from the sides of the metacarpo-phalangeal joint, corresponding to the position of the ball of the thumb in other Bats, arises by a short peduncle a circular hollow suctorial disk about one tenth of an inch in diameter. On the sole of the foot a similar but considerably smaller disk is placed, not in the same relative position, however, as on the thumb, for it covers the metatarsal bones, not the bases of the first phalanges of the toes *.

The rudimentary metacarpal bone, which alone represents the second finger, is scarcely one third the length of the metacarpal of middle finger, and is fibro-cartilaginous; the first phalanx of the middle finger exceeds the combined lengths of the second and third phalanges; tibiæ very long, considerably longer than the femur; foot small, completely rotated outwards and forwards by the wing-membrane, which extends quite to the base of the claws; toes equal in length, united together by a membrane as far as the claws, which are much curved; calcaneum longer than the foot, and very strong, with two cartilaginous projections behind at right angles to its long axis, which evidently assist the animal when climbing in an upward direction (see fig. 6 in plate accompanying my paper referred to below); tail produced beyond the interfemoral membrane to a distance nearly equal to the length of the calcaneum.

Fur moderately long and dense, forming a thick fringe along the margin of the upper lip towards the angle of the mouth, but the wing- and interfemoral membranes above and beneath are almost naked. Above, reddish brown; beneath, the greater part of the breast and abdomen are pale yellowish white; the under surface of the muzzle, the neck, and the sides of the body reddish brown; membranes dark brown.

Upper incisors short, in pairs, separated from the canines and also in front; inner incisor on each side directed slightly forwards and inwards, with a second postero-external cusp, outer incisor unicuspidate, as long or slightly longer than the outer cusp of the inner incisor and parallel to it; upper canines small, scarcely longer than the second premolar; first upper premolar smaller than the second, but well developed; third premolar very large, shaped like a molar, with a broad internal basal process; lower incisors small, in the direction of the jaws; lower canines very small; lower premolars well developed, nearly equal in size, the first slightly smaller than the others.

Length (of an adult ♂), head and body 1″·7, tail 1″, free from membrane 0″·3, head 0″·65, ear 0″·5, tragus 0″·18, forearm 1″·5, thumb 0″·2; third finger—metacarp. 1″·4, 1st ph. 0″·6, 2nd ph. 0″·25; fourth finger—metacarp. 1″·4, 1st ph. 0″·38, 2nd ph. 0″·3; fifth finger—metacarp. 1″·2, 1st ph. 0″·4, 2nd ph. 0″·35; tibia 0″·7, calcaneum 0″·33, foot 0″·22.

Hab. Brazil.

* For figures and description of the minute anatomy of these adhesive disks, see my paper in P. Z. S. 1876, pp. 531–534.

This very remarkable species, the single representative of the genus *Thyroptera*, is not only peculiar among all the species of Chiroptera in possessing such highly specialized climbing organs as the adhesive disks described above, but also in the structure of the wings and in the feet agrees with none of the species of the family to which it belongs, resembling instead, in the presence of three phalanges in the middle finger, the species of the very far-removed family *Phyllostomidæ*, while in the equal number of phalanges in the toes it corresponds alone with the species of the subfamily *Phyllorhininæ* (Rhinolophidæ).

a. ad. sk.	Chamicuros, Peruvian Amazons.	Mr. Bartlett [C.].
b, c. ♂ juv. et ad., al.	Chamicuros, Peruvian Amazons.	Mr. Bartlett [C.].
d. ♂ ad., al.	Cayenne.	M. Taczanowski [C.].

16. MINIOPTERUS.

Miniopterus, *Bonaparte, Fauna Italica*, fasc. xxi. (1837); *Gray, Mag. Zool. & Bot.* 1838, p. 497; *Keys. & Blas. Wiegm. Archiv*, 1840, p. 4; *Wagner, Suppl. Schreb. Säugeth.* p. 735 (1855); *Blasius, Fauna Deutschl.* p. 45 (1857); *Tomes, P. Z. S.* 1858, p. 117; *Dobson, Monogr. Asiat. Chiropt.* p. 160 (1876).

Crown of the head abruptly and considerably raised above the face-line; ears separate, rhomboidal, the outer margin carried forwards to the angle of the mouth; tragus like that in *Vesperugo*; nostrils simple, opening sublaterally by lunate apertures, the extremity of the nose separated from the upper lip on either side in front and beneath by a narrow groove; muzzle broad, with well developed glandular prominences; *the first phalanx of the second or longest finger very short*, less than one third the length of the terminal phalanx, and but slightly longer than the first phalanx of the fourth finger, the second or terminal phalanx of the same finger very long, flexed forwards in repose on the under surface of the metacarpal bone, and reaching in that position beyond the middle of the bone; wings to the ankles or to the tibiæ, attached to the inferior surface, and continuous with a band of integument passing across the ankle to the interfemoral membrane covering the calcaneum; feet long, slender, toes nearly equal in length; *tail as long as the head and body, wholly contained within the interfemoral membrane.*

Dentition. Inc. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

Skull greatly vaulted, the vertex as high or higher than the occiput, and separated from it by a slight transverse concavity; base of the skull broad, basioccipital laterally grooved; cochleæ partially concealed by the tympanic bullæ; the bony palate extending very slightly behind the anterior roots of the zygoma; premaxillaries more developed than in either *Vespertilio* or *Vesperugo*; upper incisors short, weak, in pairs on each side, separated from the canines by a space.

Range. Generally distributed throughout the Eastern Hemisphere on both sides of the equator, not extending, however, into the colder regions of the temperate zones.

The species of this genus are so very closely allied that almost the only differences noticeable are size, relative lengths of parts, and distribution of the fur.

Synopsis of the Species.

a. No lobule or projection above the base of the outer margin of the tragus.
  a'. Interfemoral membrane nearly naked.... 1. *M. schreibersii*, p. 348.
  b'. Half the interfemoral membrane clothed.
    a''. Wing-membrane external to the tibiæ naked; muzzle longer..... 2. *M. australis*, p. 351.
    b''. Wing-membrane with a band of fur extending from the elbow to the ankle; muzzle shorter..... 3. *M. scotinus*, p. 351.
b. A distinct triangular projection above the base of the outer margin of the tragus.... 4. *M. tristis*, p. 352.

1. Miniopterus schreibersii.

Vespertilio schreibersii, *Natterer, in Kuhl, Deutsch. Flederm. Wetterau. Ann.* iv. p. 41 (1819); *Desmarest, Mammalogie*, p. 138 (1820); *Temminck, Monogr. Mammal.* ii. p. 174 (1835–41).
Vespertilio natalensis, *Smith, S. African Quart. Journ.* 1831.
Vespertilio fuliginosa, *Hodgson, Journ. Asiat. Soc.* iv. p. 700 (1835).
Miniopterus ursinii, *Bonaparte, Fauna Italica* (1837).
Vespertilio orsinii, *et* blepotis, *et* dasythrix, *Temminck, l. c.* pp. 179, 212, 268 (1835–41).
Trilatitus blepotis, *Gray, Ann. & Mag. Nat. Hist.* 1842, p. 258.
Vespertilio eschscholtzii, *Waterhouse, P. Z. S.* 1845, p. 121.
Miniopterus schreibersii, *Keys. et Blas. Wirbelth. Europ.* p. 44; *Blasius, Fauna Deutschl.* p. 46, figs. 28, 29 (head and ear) (1857); *Dobson, Monogr. Asiat. Chiropt.* p. 160 (1876).
Miniopterus schreibersii, *et* blepotis, *et* tibialis, *Tomes, P. Z. S.* 1858, p. 126.

Muzzle rather short, glandular prominences well developed, increasing the width of the face; margin of the eye prominent; a deep horizontal groove on the side of the face parallel to the mouth, below the eye; ears much shorter than the head; the inner margin of the ear very convex forwards, projecting in front of the eye, then curving almost horizontally backwards to the tip, the position of which is determined only by a slight flattening of the upper third of the outer margin; outer margin straight above, emarginate opposite the base of the tragus, and terminating rather abruptly in a moderately deep square-ended lobe close to the angle of the mouth. Tragus rather more than twice as long as broad, maintaining the the same breadth upwards, and obtusely rounded off above; the inner margin slightly concave above, the outer margin correspondingly convex in its upper third, and straight in its lower two thirds, parallel to the inner margin; above the base a slight convexity appears in most specimens, but no indication of a distinct lobule, as in *Vesperugo*.

Thumb moderate; terminal phalanx of longest finger flexed forwards, in repose, on the under surface of the metacarpal, reaching as far as the junction of the proximal and middle thirds of that bone; wings to the ankles, or to the extremity of the tibiæ; feet long and slender, the outer toe (corresponding to the hallux, or inner toe, in other five-toed mammals) nearly on a level with the extremities of the other toes; tail slightly longer than the head and body, *wholly contained* within the interfemoral membrane; no post-calcaneal lobe.

The face in front of the eyes is covered with short fur interspersed with longer hairs arising from the glandular prominences on the sides of the muzzle; on the wing-membrane the fur extends as far as a line drawn from the end of the proximal third of the humerus to the middle of the femur, and upon the interfemoral to a very small extent, about as far as the end of the first caudal vertebra. Beneath, the wing-membrane is clothed as far as a line drawn from the middle of the humerus to the knee; the interfemoral has a few long hairs about the root of the tail, but about half the surface of the membrane is covered with a very fine pubescence; a band of fine short hairs passes outwards on the wing-membrane behind the forearm to the carpus.

The colour of the fur varies very considerably. In European specimens it is generally light greyish all over, or sometimes reddish, the basal half of the hairs dark greyish brown. In specimens from Northern Africa, inhabiting dry sandy regions, the fur is light grey all over, while those from South Africa are much darker, the extremities of the hairs generally reddish grey. In the European and North-African specimens with pale fur, the ears and interfemoral membrane are white and the integument generally of a pale whitish colour, the wing-membranes light greyish brown. In the darker-coloured specimens, especially in those from South Africa, the ears and integuments are dark brown.

The inner upper incisor, on each side, is but slightly longer than the outer incisor, and slants inwards and forwards, on its outer side near the base a small blunt cusp; the outer incisor unicuspidate, blunt, and slanting less inwards than the inner one. Canines moderately long and straight, with a horizontal slightly raised cingulum, without a second cusp or basal projection. First upper premolar unicuspidate, with a small narrow acutely pointed cusp and a broad cingulum, more developed posteriorly, touching the cingulum of the second premolar, which is also horizontally expanded, but in an anterior direction; a wide space is thus caused between the summits of the canine and second premolar, and the extremity of the first premolar is much closer to the canine than to the second premolar; the whole tooth is also slightly pushed inwards. The last molar is somewhat more than half the antero-posterior diameter of the second premolar. In the lower jaw the four front incisors are nearly equal in size and are trilobed, those next the canines larger, with rounded summits, and a single furrow on the inner side cutting off a low blunt cusp. The cingulum of the

lower canines is horizontal behind, directed upwards, forwards, and inwards in front, forming a small blunt projection above the inner incisor. The first and second lower premolars are small and nearly equal, less than half the size of the third premolar.

(For measurements see p. 352.)

Hab. Southern Europe and Asia, Africa, Madagascar, and Australia. In Europe inhabiting Spain, Switzerland, Lower Austria, Italy, and Sicily; in Asia, Syria, India, Ceylon, Burma, Southern China (Amoy), Japan, Philippine Islands; extending through the Malay Archipelago to Australia; probably generally distributed throughout Africa and Madagascar.

Although so widely separated, specimens of this species from Europe and Australia differ to no appreciable extent, except in the colour of the fur. This difference in colour evidently depends upon the latitude of the country inhabited, as examples from colder countries have fur of a much paler shade than those from warmer regions.

a, *b*. ♂ & ♀, ad., al.	Seville.	Lord Lilford [P.].
c–*h*. ♂ & ♀, ad., al.	Spezia.	Marquis Doria [P.].
i. ♂ ad., al.	Sicily.	
j, *k*. ad. sk.	Algiers.	M. Parzudaki [C.].
l. ad. sk.	Algiers.	Purchased.
m. ♂ ad., al.	King William's Town.	H. Trevelyan, Esq. [P.].
n. skull.	Cape of Good Hope.	G. Ford, Esq. [P.].
o. ♀ ad., al.	Madagascar.	Purchased.
p, *q*. ad. sks.	Madagascar.	Purchased.
r–*v*. ad. sks.	Japan.	Purchased.
w. ad. sk.	Japan.	Purchased.
x–*z*. ♀ ad. sks.	Amoy, China.	R. Swinhoe, Esq. [C.].
a', *b'*. ♂ & ♀ ad., al.	Tsagine, Upper Burma.	Dr. J. Anderson [C.].
c', *d'*. ♂ ad., al.	Ceylon.	Mr. Cuming [C.].
e'. ad. sk.	Java.	
f', *g'*. ♂ ad., al.	Philippine Islands.	
h'. ♀ ad., al.	Philippine Islands.	
i'. ♂ imm., al.	Luzon, Philippine Islands.	
j'. ♀ ad., al.	Philippine Islands.	Zool. Soc. Coll.
k'. ♀ ad., al.	Philippine Islands.	Zool. Soc. Coll.
(Type of *Vespertilio eschscholtzii*, Waterh.)		
l'. ♀ ad., al.	Philippine Islands.	Purchased.
m'. ♀ ad., al.	Philippine Islands.	Mr. Cuming [C.].
n'. ad. sk.	Batchian Island.	A. R. Wallace, Esq. [C.].
o', *p'*. ♂ ad., al.	Islds. of Torres Straits.	Rev. J. Macfarlane [C.].
q'. ad. sk.	Australia.	Sir G. Grey [P.].
r'. ad. sk.	Australia.	
s', *t'*. ad. sks.	New South Wales.	Earl of Derby [P.].
u', *v'*. ♂ & ♀ ad., al.	New South Wales.	Purchased.
w'. ♀ ad., al.	Clarence River.	Purchased. [C.].
x'. ad. sk.	New Guinea.	Rev. W. Y. Turner, M.D.
y'. ad. sk.		Sir A. Smith [P.].
z'. ad. sk.		Stockholm Museum.
a''. ad. sk.		M. Parzudaki [C.].
b''. ad. sk.		
c''. skull of *h*.		
d''. skull of *i*.		

Var. *a*.

Miniopterus pusillus, *Dobson, Monogr. Asiat. Chiropt.* p. 162 (1876).
Miniopterus australis, *Tomes* (in part), *P. Z. S.* 1858, p. 125.

Quite similar in structure to *M. schreibersii*, but considerably smaller, and the distribution of the fur is slightly different. In perfectly adult specimens the length of the head does not exceed 0″·6 inch and that of the forearm 1″·6. (See Table of measurements at p. 352.)

On the upper surface the fur extends upon the interfemoral membrane as far as the end of the third caudal vertebra; in other respects the distribution is similar to that of *M. schreibersii*.

Fur intensely black throughout, the extreme tips of the hairs sometimes greyish.

(For measurements see next page.)

Hab. India (Madras); Andaman and Nicobar Islands; Philippine Islands (Erumango).

a. ♀ ad., al.	Madras.	Sir A. Smith [P.].
b–d. ♂ ad., al.	Philippine Islands.	Mr. Cuming [C.].

2. Miniopterus australis.

Miniopterus australis, *Tomes, P. Z. S.* 1858, p. 125.

About the same size as the small form of *M. schreibersii* (*M. pusillus*), but differing in the greater length of the muzzle and in the distribution of the fur. The interfemoral membrane is clothed as far back as a line drawn from one ankle to the other; the tibiæ are also covered with fine hairs, and a small patch of short fur appears upon the wing-membrane between the elbow and forearm.

Above, dark reddish brown throughout; beneath, darker brown at the base of the hairs, the extremities greyish.

(For measurements see next page.)

Hab. Australia; Loyalty Islands.

a–d. ♂ & ♀ ad., al. (types).	Loyalty Islands.	Sir G. Grey [P.].
e. ♀ ad., al.	Lifu, Loyalty Islands.	Rev. S. J. Whitmee [P.].

3. Miniopterus scotinus.

Miniopterus scotinus, *Sundevall, Öfvers. Vetensk. Akad. Förhandl.* 1846, p. 119; *Tomes, P. Z. S.* 1858, p. 127; *Peters, C. von der Decken, Reis. in äquat. Ost-Africa, Säugeth.* p. 7, pl. iii. (1869).
Miniopterus minor, *Peters, MB. Akad. Berl.* 1866, p. 885.

Much smaller than *M. schreibersii*; about the size of *M. australis*, from which it is distinguished by the shorter head and by the distribution of the fur.

On the upper surface a distinct band of short hairs extends backwards from the elbow to the ankle, while inside the space between the outer half of the humerus and the tibia and knee is almost quite naked; half the interfemoral membrane is clothed with short,

thinly spread fur, which also extends in a band on each side internal to the legs to the base of the calcaneum.

Above bright reddish brown or dark brown, almost black, the lower surface always paler.

(For measurements see below.)

Hab. S.E. Africa; Madagascar.

a. ad. sk.	Port Natal.	Stockholm Museum.
b–e. ad. sks.	Manavimena, Madagascar.	Purchased.
f, g. ad. sk.	Manavimaity, Madagascar.	Purchased.

4. Miniopterus tristis.

Vespertilio tristis, *Waterhouse, Ann. & Mag. Nat. Hist.* xvi. p. 50 (1845); *Wagner, Suppl. Schreb. Säugeth.* v. p. 743 (1855).
Miniopterus tristis, *Tomes, P. Z. S.* 1858, p. 124.

In general form and in the very black colour of the fur closely resembling the dark-coloured examples of *M. schreibersii*, found also in the same country. The muzzle, however, is comparatively shorter, broader, and more obtuse; the outer margin of the tragus has a *distinct triangular lobule* near the base, which, taken with the very much larger size of the animal, at once distinguishes the species.

The fur is very dark brown throughout, which, when moistened in spirit, appears intensely black.

The distribution of the fur is similar to that in *M. schreibersii*.

(For measurements see below.)

Hab. Philippine Islands.

a. ♀ ad. sp. (type).	Philippine Islands.	Zool. Soc. Collection.

The following are the measurements of the different species and varieties of this genus :—

	Length, head and body.	tail.	head.	ear.	tragus.	forearm.	thumb.	third finger.	do., 1st phalanx.	fourth finger.	fifth finger.	tibia.	foot.
	"	"	"	"	"	"	"	"	"	"	"	"	"
M. schreibersii (Spain)	2·0	2·3	0·7	0·5	0·23	1·75	0·3	3·5	0·45	2·55	2·1	0·75	0·4
" " (Madagascar) .	2·2	2·2	0·7	0·55	0·25	1·9	0·3	3·6	0·45	...	2·1	0·75	0·38
" " (Burma)	2·3	2·3	0·7	0·53	0·23	2·0	0·3	3·8	0·45	...	2·25	0·8	0·4
" " (N. S. Wales) .	2·2	2·2	0·7	0·5	0·22	1·75	0·3	3·5	0·45	2·4	2·0	0·75	0·38
" " var. *pusillus* (Nicobars)	1·8	1·85	0·6	0·4	0·2	1·6	0·2	3·0	0·38	...	1·85	0·6	0·3
M. australis (Loyalty Islands)	1·7	1·7	0·65	0·45	0·2	1·6	0·2	3·1	0·4	2·2	1·75	0·6	0·33
M. scotinus (Madagascar).. ...	1·75	1·75	0·6	0·4	0·2	1·5	0·25	2·8	0 38	...	1·7	0·55	0·33
M. tristis (Philippines).....	2·4	2·6	0·85	0·65	0·3	2·1	0·33	4·1	0·5	2·9	2·2	0·75	0·45

Family EMBALLONURIDÆ.

Brachyura *et* Molossi, *Peters, MB. Akad. Berl.* 1865, p. 257.
Noctilionidæ *et* Vespertilionidæ (in part), *Gray, Ann. & Mag. Nat. Hist.* 1866, xvii. p. 89.
Emballonuridæ, *Dobson, Ann. & Mag. Nat. Hist.* 1875, xvi. p. 347; *Monogr. Asiat. Chiropt.* p. 164 (1876).

Bats with nostrils opening by simple or valvular apertures at the projecting extremity of the muzzle, not surrounded or margined by distinct cutaneous foliaceous appendages*; with generally large, often united ears, arising by their inner margins from the sides of the forehead, with short, occasionally minute tragi, usually expanded above, with two phalanges in the middle finger, of which the first is folded (in repose) forwards on the upper surface of the metacarpal bone†; with the tail partially free, either perforating the interfemoral membrane and appearing upon its upper surface, or produced far beyond its posterior margin.

The number of the teeth varies so much that no general dental formula can be given. The upper incisors are, in most genera, large, are separated from the canines and also in front, and have their extremities directed slightly forwards and inwards; molars well developed, with very distinct W-shaped cusps.

The *Emballonuridæ* are generally easily distinguished by the peculiar form of the muzzle, which is obliquely truncated, the nostrils projecting more or less in front beyond the lower lip‡; by the manner in which the first phalanx of the middle finger is folded (in repose); by the tail, which either perforates the interfemoral membrane or is produced far beyond it; and by the upper incisors, which are generally a single pair separated from the canines and also in front.

Distribution. Generally distributed throughout the tropical and subtropical regions of both hemispheres; rarely extending north or south of the thirtieth parallels of latitude.

Subfam. I. EMBALLONURINÆ.

Tail slender, perforating the interfemoral membrane and appearing upon its upper surface, or terminating in it; legs long, fibulæ very slender; upper incisors weak.

* The nostrils open on the front surface of a fleshy prominence resembling a small nose-leaf in *Rhinopoma*.

† Except in *Noctilio* and in *Mystacina*. In the latter genus, represented by a single species only, the first phalanx of the middle finger is folded forwards on the *inferior surface* of the metacarpal bone.

‡ Except in *Taphozous* and in *Diclidurus*.

Synopsis of Groups and Genera.

I. Tail shorter than the large interfemoral membrane; index finger formed by the metacarpal alone.

A. First phalanx of the middle finger folded (in repose) on the dorsal surface of the metacarpal bone.

a. Tail terminating in the interfemoral membrane.

a'. Crown of the head greatly elevated above the face-line; thumb and first phalanx of the middle finger very short; inc. $\frac{2-2}{6}$, pm. $\frac{2-2}{3-3}$ .. *Group FURIÆ.*

a''. Nasal apertures oval, close together in front; bony palate not produced backwards behind the last molar ..... 1. FURIA, p. 356.

b''. Nasal apertures triangular, widely separated; bony palate produced as far back as the middle of the zygomatic arches. 2. AMORPHOCHILUS, p. 357.

b. Tail perforating the centre of the large interfemoral membrane, and appearing upon its upper surface.

b'. Part of the tail included in the basal half of the interfemoral membrane, which it perforates simply.

b''. Crown of the head slightly elevated above the face-line; thumb and first phalanx of the middle finger moderately long; premolars $\frac{2-2}{2-2}$ ..... *Group EMBALLONURÆ.*

b'''. Lower incisors 6; premaxillaries osseous; upper incisors persistent.

a. No pouch in the antebrachial membrane.

a'. Upper incisors 2—2.

a''. Extremity of the muzzle more or less produced beyond the lower lip; forehead flat ..... 3. EMBALLONURA, p. 359.

β'. Upper incisors 1—1.

β''. Extremity of the muzzle broad, slightly produced beyond the lower lip; forehead concave ..... 4. COLËURA, p. 364.

γ''. Extremity of the muzzle narrow, much produced beyond the lower lip; forehead flat ..... 5. RHYNCHONYCTERIS, [p. 366.

β. Antebrachial membrane with a pouch opening on its upper surface.
γ'. Upper incisors 1—1.
δ''. Extremity of the muzzle more or less produced beyond the lower lip; forehead flat ..... 6. SACCOPTERYX, p. 369.
c'''. Lower incisors 4; premaxillaries cartilaginous; upper incisors deciduous.
δ'. Upper incisors 1—1.
ε''. Extremity of the muzzle not produced beyond the lower lip; forehead deeply concave ..... 7. TAPHOZOUS, p. 378.

c'. Part of the tail suspended in a fold derived from the inferior surface of the basal half of the interfemoral membrane, the terminal portion perforating the bottom of a pouch formed in the centre of the membrane.
c''. Crown of the head slightly elevated above the face-line; thumb very short; extremity of the muzzle not produced beyond the lower lip; forehead deeply concave ..... *Group DICLIDURI.*
c'''. Incisors $\frac{1-1}{6}$, pm. $\frac{2-2}{2-2}$ ..... 8. DICLIDURUS, p. 390.

B. First phalanx of the middle finger extended (in repose) in a line with the metacarpal bone; premaxillaries united; upper incisors strong ..... *Group NOCTILIONES.*
a. Upper middle incisors close together in the centre of the space between the canines; ears very narrow; chin with transverse cutaneous ridges; inc. $\frac{4}{2}$, pm. $\frac{1-1}{2-2}$ ..... 9. NOCTILIO, p. 393.

II. Tail much longer than the short interfemoral membrane; index finger with two phalanges.
C. First phalanx of the middle finger incompletely folded (in repose) on the dorsal surface of the metacarpal bone; premaxillaries united; incisors very weak ..... *Group RHINOPOMATA.*
a. Upper incisors small, very slender, diverging outwards; ears united; a small nose-leaf behind the valvular nostrils; inc. $\frac{2}{4}$, pm. $\frac{1-1}{2-2}$ ..... 10. RHINOPOMA, p. 399.

Group FURIÆ.

Furiæ, *Peters, MB. Akad. Berl.* 1877, p. 185.

Ears arising separately by their inner margins from the sides of the forehead; outer margin of the ear-conch terminating abruptly near the base of the tragus; tragus short, triangular; muzzle very obtuse; nostrils opening anteriorly by oval or triangular apertures; thumb very short, inclosed in the antebrachial membrane to the base of the very feeble claw; tail terminating in the centre of the large interfemoral membrane, not perforating it or appearing upon its upper surface.

Crown of the head greatly elevated above the face-line, even more so than in *Miniopterus*; no postorbital processes; horizontal plate of the maxillary bones produced forwards as a slender pointed process terminating between the premaxillaries.

Dentition. Inc. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

Range. The Neotropical Region (Brazilian and Chilian Subregions).

1. FURIA.

Furia, *F. Cuvier, Mém. du Mus.* xvi. p. 150.
Furipterus, *Bonaparte, Fauna Italica*, i. (1832–41).

Muzzle obtuse in front, its superior front margin not elevated above the nostrils; nasal apertures oval, close together; bony palate terminating behind in a line with the posterior molars.

Range. Brazilian Subregion.

1. Furia horrens.

Furia horrens, *F. Cuvier, Mém. du Mus.* xvi. p. 150; *Temminck, Monogr. Mammal.* ii. p. 264 (1835–41); *Wagner, Suppl. Schreb. Säugeth.* i. p. 549 (1849); *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 70, pl. xi. fig. 2, xiv. figs. 6, 6*a*–6*c* (skull and teeth) (1855).
Furipterus horrens, *Bonaparte, Fauna Italica* (1832–41).
Furipterus horrens *et* cærulescens, *Tomes, P. Z. S.* 1856, p. 176, pl. xlii.

Ears rounded and very broad, like those of *Kerivoula papillosa*, the inner margin of the ear-conch so convex as to extend forwards in a line with the end of the muzzle, the side of the ear concealing the eye; upper third of the outer margin slightly concave, lower two thirds convex, terminating abruptly; tragus very peculiar, triangular, rising from a narrow base, above which it immediately expands, forming the base of the triangle whereof the outer and superior angles are narrow and long, the inner angle short and thickened; concave surface of the ear-conch with numerous glandular elevations (as in *Kerivoula*), from which small hairs arise; upper and lower lips very thick, fringed with long hairs. Nostrils opening close together by oval apertures directed downwards and

forwards, the extremity of the muzzle almost concealed by the long hairs fringing the sides. Thumb exceedingly short, contained to the base of the very small claw within the antebrachial membrane; first phalanx of the middle finger very short, not equal to the first phalanx of the third finger in length, partially flexed (in repose) upon the dorsal surface of the metacarpal bone.

Wings from the tarsus; feet small; claws long and strongly curved; near the base of the claw on the plantar surface of the fifth toe a small wart is placed; calcaneum as long as the tibia; interfemoral membrane very large, as long as the head and body; tail terminating in the membrane opposite the ankles.

Fur long and dense, extending upon the wing-membrane along the sides of the body only, and leaving the remainder of the wings, the arm-bones, and the tibiæ naked; also upon the interfemoral above as far as the end of the second caudal vertebra; beneath, thinly covering the greater part with fine thinly spread hairs ranged along the transverse lines. The sides of the muzzle to the very end of the nose are densely covered, and the long thick fur quite conceals the angles of the mouth; the chin is similarly covered.

Above and beneath slate-blue, darker towards the extremities of the hairs above, paler beneath.

Upper incisors in pairs, separated in the middle, but removed from the canines on either side by a wider space, very short, the inner incisor slightly larger than the outer one, and with a small second external basal cusp, the pair of incisors on each side directed inwards and forwards; lower incisors very small, trifid, not crowded; upper canines with a small anterior and larger posterior basal cusp; first upper premolar in the centre of the space between the canine and second premolar, unicuspidate, and inclined slightly forwards; second upper premolar with an anterior and internal basal projection; last upper molar three fourths antepenultimate molar; lower canines very small and slender, nearly equalled by the second premolar in vertical extent, and exceeded by it in cross section; first lower premolar like the corresponding tooth above, but smaller; molars with five acutely pointed cusps, last molar smaller, with four.

(For measurements see p. 358.)

Hab. South America (Surinam, Brazil).

a. ♀ ad., al.	Surinam.	Berlin Museum [E.].

2. AMORPHOCHILUS.

Amorphochilus, *Peters*, *MB. Akad. Berl.* 1877, p. 185.

Muzzle very obtuse in front, its superior front margin forming a fleshy prominence above the nostrils; nasal apertures triangular, widely separated; bony palate produced backwards as far as a line corresponding to the centres of the zygomatic arches.

Range. Chilian Subregion.

1. Amorphochilus schnablii.

Amorphochilus schnablii, *Peters, MB. Akad. Berl.* 1877, pp. 185–87, pl. figs. 1–10.

Ears rounded, almost as broad as high, extending to the extremity of the muzzle; outer margin of the ear-conch slightly emarginate below; tragus as in *F. horrens*, broadly triangular, arising from a narrower base, the outer angle of the triangle acutely pointed, the shorter inner and the longer superior angle rounded off. The small eyes are almost concealed by the ears. The upper lip is high, and its upper front extremity projects beyond the lower lip. The almost triangular nasal apertures are placed in the front surface of a fleshy disk, like the extremity of a pig's snout, the upper rim of which, as in a pig, is raised above the muzzle. Whilst the nasal apertures in *Furia* are separated only by a narrow partition, in this species the partition is very broad. At the angle of the mouth a peg-like lappet is placed, which also appears in *Furia*, though less developed; on each side of the lower lip a second lappet with its extremity inclined inwards; and in the middle of the inferior surface of the muzzle another lappet, which sends forth on either side a cutaneous ridge directed outwards and backwards. In the middle of the margin of the lower lip a broad, smooth, triangular pad. Palate-ridges nine.

Wings as in *Furia*. The transverse lines on the interfemoral membrane clothed with short hairs, and the tail terminates at the eighth of these lines; the wing-membrane along the sides of the body is covered as far as a line corresponding to the middle of the humerus.

Fur dark brown; the hairs of the back paler in the middle, the shorter hairs beneath paler at their extremities.

Teeth as in *Furia horrens*.

The following are the measurements of adult ♀ specimens of (I.) *Furia horrens* and (II.) of *Amorphochilus schnablii* respectively:—

	I.	II.
Length, head and body	1·5	1·5
„ tail	1·1	0·9
„ head	0·55	0·55
„ ear	0·45	0·43
„ tragus	0·12	0·12
„ forearm	1·4	1·35
„ thumb	0·1	0·08
„ third finger, metacarpal	1·35	1·29
„ „ 1st phalanx	0·2	0·16
„ „ 2nd „	0·9	0·9
„ fourth finger, metacarpal	1·2	1·15
„ „ 1st phalanx	0·25	0·24
„ „ 2nd „	0·35	0·4
„ fifth finger, metacarpal	1·1	1·1
„ „ 1st phalanx	0·45	0·4
„ „ 2nd „	0·18	0·28
„ tibia	0·5	0·6
„ foot	0·25	0·27 *

* The above description of *Amorphochilus schnablii* has been translated by me

Comparison of the above measurements shows how very closely *A. schnablii* agrees with *F. horrens* in size; the differences are indeed so slight that if the measurements of the specimens had been made by the same person, it is probable they might have been almost identical. This remarkably close correspondence in size and (as far as I can judge from the excellent figures and description) absolute agreement in dental characters, as well as in the form of the ear and tragus, renders it very doubtful whether, even with the apparently great structural differences in the form of the extremity of the muzzle and of the bony palate, we should consider this species the type of a genus distinct from *Furia*.

Hab. Tumbez, Peru.

Group EMBALLONURÆ.

Ears arising by their inner margins from the sides of the forehead; outer margin of the ear-conch terminating in a lobe carried forwards towards the angle of the mouth; tragus longer than broad, generally expanded above; nostrils opening close together at the extremity of the conical muzzle; thumb and first phalanx of the middle finger moderately long; tail perforating the large interfemoral membrane about its centre and appearing upon its upper surface.

Crown of the head slightly elevated above the face-line; postorbital processes distinct, generally very long.

Range. Tropical and Subtropical Regions of both hemispheres.

3. EMBALLONURA.

Emballonura, *Temminck* (in part), *Van der Hoeven, Tijdsch. Natur. Gesch.* p. 22 (1839); *Peters, MB. Akad. Berl.* 1867, p. 479; *Dobson, Monogr. Asiat. Chiropt.* p. 164 (1876).

Centronycteris, *Gray, Voyage of the 'Sulphur,' Mammalia*, p. 23 (1844) (not *Mag. Zool. & Bot.* 1838, p. 99, *vide infrà*, p. 377).

Ears arising separately from the sides of the forehead; outer margin of the ear-conch terminating in a long lobe behind the angle of the mouth below the eye; tragus longer than broad, generally slightly expanded above; apertures of the nostrils circular or oblique; wings from the ankles or tarsi; antebrachial membrane without a pouch; interfemoral membrane large, extending much beyond the point at which it is pierced by the tail, and having its posterior free margin supported by long calcanea.

Nasal bones slightly convex; muzzle broad and flat above, increasing in width in front of the postorbital processes.

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from the recently published original description of the species described by Dr. Peters from a single specimen, which I have not yet had an opportunity of examining.

Dentition. Inc. $\frac{2-2}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Upper incisors in pairs, separated from the canines and also in the middle.

Range. From Madagascar to the Navigators' Islands; no species has as yet been discovered in the continents of Asia or Australia.

Synopsis of the Subgenera and Species.

I. Nostrils close together in front, opening by circular apertures directed forwards; upper lip projecting more or less beyond the lower in front; lower incisors separated on each side from the canines..... Subg. EMBALLONURA.
  a. Inner margin of the tragus concave.
    α. Calcaneum shorter than the tibia; wings from the ankles; forearm 1″·7. 1. *E. semicaudata*, p. 360.
  b. Inner margin of the tragus convex.
    β. Calcaneum shorter than the tibia; wings from the feet; forearm 1″·4 .. 2. *E. monticola*, p. 361.
    γ. Calcaneum longer than the tibia; wings from the ankles; forearm 1″·5 ..... 3. *E. atrata*, p. 362.

II. Nostrils widely separated, opening by elliptical apertures placed obliquely; upper lip not projecting in front; lower incisors filling up the space between the canines .. Subg. MOSIA.
  b. Inner margin of the tragus convex.
    δ. Calcaneum shorter than the tibia; wings from the base of the toes; forearm 1″·45..... 4. *E. nigrescens*, p. 363.

1. Emballonura semicaudata.

Vespertilio semicaudatus, *Peale, United States Expl. Exp., Mammalia*, p. 23, pl. iii. fig. 2 (1848).
Emballonura semicaudata, *Wagner, Suppl. Schreb. Säugeth.* v. p. 698 (1855); *Peters, MB. Akad. Berl.* 1867, p. 480.
Emballonura fuliginosa, *Tomes, P. Z. S.* 1859, p. 77.

Muzzle pointed in front, its extremity projecting considerably beyond the lower lip; nostrils close together, separated by a narrow groove opening almost directly forwards; lower lip not grooved, but the chin is divided by a vertical furrow in the middle; ears shorter than the head, their inner margins arising from the forehead above the eye; lower half of the inner margin of the ear-conch slightly convex, upper half straight, tip narrowly rounded off; outer margin concave in upper one sixth immediately beneath the tip, then straight to a point opposite the base of the tragus, where it is slightly emarginate, terminating in a convex lobe; tragus somewhat expanded above and slightly curved inwards, lower two thirds of the outer margin straight, upper third convex, tip broadly rounded off, inner margin concave.

Wings from the ankles; interfemoral very large; calcaneum nearly as long as the tibia; last caudal vertebra alone projecting.

Upper incisors in pairs in the centre of each half of the space between the canines, equal in size and in vertical extent, unicuspidate, with oblique cusps directed downwards and slightly inwards; lower incisors very small, trifid, not crowded, the outer tooth on either side separated from the canine by a space; first upper premolar scarcely raised above the gum, in the centre of the space between the canine and second premolar and rather to the outer side of the tooth-row; upper canine with small anterior and posterior basal cusps; first lower premolar scarcely half the size of the second, triangular, with a small anterior and posterior basal cusp; last upper molar nearly three fourths the antepenultimate molar.

Length, head and body 1″·8, tail 0″·6, head 0″·7, ear 0″·6, tragus 0″·18, forearm 1″·7, thumb 0″·28, third finger—metacarp. 1″·6, first ph. 0″·5, second ph. 0″·8; fourth finger—metacarp. 1″·3, first ph. 0″·4, second ph. 0″·35; fifth finger—metacarp. 1″·25, first ph. 0″·42, second ph. 0″·2, tibia 0″·7, calcaneum 0″·6, foot 0″·3.

A female specimen in the collection, from unknown locality, obtained during the voyage of the 'Sulphur,' has the forearm 1″·85, but the ears and calcanea are slightly shorter than in other specimens.

Hab. Polynesian Subregion (Pelew Islands, New Hebrides, Fiji Islands, Navigators' Islands).

a. ♀ ad., al.	Fiji Islands.	J. Macgillivray, Esq. [C.].
b. ad. sk.	Island of Ovalau, Fiji.	Dr. F. M. Rayner [P.].
	(Type of *Emballonura fuliginosa*, Tomes.)	
c–e. ♂ ad., al.	Island of Ngai, Fiji.	Lords of the Admiralty [P.].
f. ♀ ad., al.	Samoa.	Rev. S. J. Whitmee [P.].
g. ♀ ad., al.	Voy. of the 'Sulphur.'	Sir E. Belcher [C.].
	(Type of *Centronycteris calcarata*, Gray (non Wied).)	
h. skull.	New Hebrides.	Voyage of the 'Herald.'
i. skull.	Viti Levi, Fiji.	Voyage of the 'Herald.'
j. skull.	Island of Ngai, Fiji.	Voyage of the 'Herald.'

2. Emballonura monticola.

Emballonura monticola, *Temminck, Van der Hoeven, Tijdsch. voor Natur. Gesch.* v. p. 25, pl. ii. figs. 1, 2 (1839); *Peters, MB. Akad. Berl.* 1867, p. 480; *Dobson, Monogr. Asiat. Chiropt.* p. 165 (1876).

Vespertilio (Nycticejus) alecto, *Eydoux et Gervais, Voy. 'Favorite,'* 2e part. Zoology, p. 7 (1839).

Emballonura discolor, *Peters, MB. Akad. Berl.* 1861, p. 711.

Muzzle obtuse in front, the extremity projecting slightly beyond the lower lip; centre of the upper lip with a small, naked, triangular projection below and between the nostrils; nasal apertures circular, directed forwards and downwards. Eyes large, rather prominent. Ears narrow, slanting backwards, the inner margins arising from a point above the eye, straight in the upper half; tip

of the ear narrowly rounded off; upper third of the outer margin slightly concave, then slightly convex, emarginate opposite the base of the tragus, terminating in a rounded lobe midway between the base of the tragus and the angle of the mouth: tragus narrow, maintaining the same breadth to the tip, which is rounded off; inner margin slightly convex, outer slightly concave.

Wing-membrane from the tarsus. Feet small; toes nearly equal. Last two vertebræ of the tail projecting on the upper surface of the interfemoral membrane. Interfemoral membrane large, convex behind; calcaneum very long.

Upper incisors slender, nearly equal in vertical extent, the inner one on each side slightly longer, in pairs, separated from the canines by a space, and also in the middle; lower incisors not crowded; first upper premolar minute, in the centre of the space between the canine and the second premolar; first lower premolar small, half the vertical height of the second, but nearly equal to it in cross section.

Length, head and body 1″·5, tail 0″·5, head 0″·55, ear 0″·5, tragus 0″·18, forearm 1″·4, thumb 0″·2; third finger—metacarp. 1″·2, first ph. 0″·3, second ph. 0″·6; fourth finger—metacarp. 1″, first ph. 0″·3, second ph. 0″·28; fifth finger—metacarp. 0″·9, first ph. 0″·3, second ph. 0″·2; tibia 0″·45, calcaneum 0″·4, foot 0″·22.

Hab. Indo-Malayan Subregion (Java, Sumatra, Borneo; Philippine Islands).

a. ♀ ad., al. Luzon, Philippine Islands. Dr. Peters [P.].

3. Emballonura atrata.

Emballonura atrata, *Peters, MB. Akad. Berl.* 1874, p. 693.

Ears long, slightly shorter than the head, pointed, outer margin emarginate above, with fourteen transverse folds; tragus expanded above, almost hatchet-shaped.

Thumb longer than in any of the other species of the genus, being one fifth the length of the forearm.

Wings from the distal extremity of the tibia. Tail and calcaneum longer than the tibia.

The fur of the back is longer than that of the ventral surface, but on both surfaces slate-grey at the base, at the extremities black. As the dark-coloured extremities are longer on the upper than on the ventral surface, the hair of the back appears greyish black, while that of the abdomen is dark grey.

The second upper premolar with well-developed anterior and posterior secondary cusps.

This species is at once distinguished from *E. monticola* and *E. semicaudata* by its smaller size, which but slightly exceeds that of *E. nigrescens*. It agrees with the latter in the form of the tragus, and with *E. monticola* in the length of the ears. In the position of attachment of the wing-membrane to the end of the tibia it re-

sembles *E. semicaudata*, while it differs from all other known species of the genus in the relatively great length of the calcanea and tail, and in the greater development of the second upper premolars.

Length, head and body 1″·8, tail 0″·7, head 0″·6, ear 0″·55, tragus 0″·17, forearm 1″·5, thumb 0″·3; third finger—metacarp. 1″·4, first ph. 0″·6, second ph. 0″·8; fourth finger—metacarp. 1″, first ph. 0″·4, second ph. 0″·37; fifth finger—metacarp. 1·05, first ph. 0″·34, second ph. 0″·3, tibia 0″·6, calcaneum 0″·63, foot 0″·28.

Hab. Madagascar.

Type, an adult ♀; from the interior of Madagascar, in the collection of the Berlin Museum.

The above description of this species (of which I have not yet seen the type) is translated from the original description lately published by Dr. Peters.

4. Emballonura nigrescens.

Mosia nigrescens, *Gray, Voyage of the 'Sulphur,'* p. 23 (1844).
Emballonura nigrescens, *Peters, MB. Akad. Berl.* 1867, p. 480; *Dobson, Monogr. Asiat. Chiropt.* p. 105 (1876).

Smaller than any of the preceding species, and at once distinguished from them by the very different form of the muzzle and nostrils. Ears shorter than the head, comparatively broader than in *E. monticola* and more obtuse, rounded off above; tragus much longer than broad, slightly broader above, rounded at the tip and curved outwards; inner margin convex, outer correspondingly concave (Plate XX. fig. 1, ear, double natural size); muzzle rather short and obtuse, the upper lip not projecting beyond the lower one, the forehead concave between the eyes; nostrils rather wide apart, opening by obliquely placed elliptical apertures, whereof the margins do not project; eyes prominent, with a groove on the face beneath each.

Feet small; wings from the base of the toes; calcaneum three fourths the length of the tibia.

Fur, above, dark brown at the terminal fourth, paler towards the base; beneath paler brown throughout, scarcely extending upon the membranes or extremities, which are dark brown or black.

Upper incisors small, acutely pointed, unicuspidate, close together, directed inwards and forwards, the inner incisor slightly shorter than the outer one; lower incisors not crowded, filling up the space in a semicircular row between the canines; first upper premolar very small, scarcely raised above the gum, in the space between the canine and second premolar but closer to the canine.

Length (of an adult ♂), head and body 1″·55, tail 0″·5, head 0″·55, ear 0″·5, tragus 0″·15, forearm 1″·45, thumb 0″·2; third finger—metacarp. 1″·25, 1st ph. 0″·38, 2nd ph. 0″·6; fourth finger—metacarp. 0″·98, 1st ph. 0″·3, 2nd ph. 0″·3; fifth finger—metacarp. 0″·95, 1st ph. 0″·3, 2nd ph. 0″·22; tibia 0″·5, calcaneum 0″·4, foot 0″·22.

Hab. Austro-Malayan Subregion (Ternate; Amboina; Duke of York Island, New Ireland).

a.	♂ imm., al. (type).	Amboina.	Sir E. Belcher [C.].
b.	♂ ad., al.	Duke of York Island.	Rev. G. Brown [C.].

4. COLËURA.

Colëura, *Peters, MB. Akad. Berl.* 1867, p. 479.

Ears as in *Emballonura*; tragus longer than broad, slightly narrower above; wings from the ankles or tarsus; antebrachial membrane without a pouch; interfemoral membrane very large; tail short, projecting on the upper surface by the last caudal vertebra.

Nasal bones concave, frontal depressed; postorbital processes of the frontal long and slender; premaxillaries not united in front.

Dentition. Inc. $\frac{1-1}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Lower incisors not separated by an interval on each side from the canines. Upper incisors equally distant from the canines and from each other.

The bony palate does not extend so far back as in *Emballonura*, and the basisphenoid is much more deeply excavated, almost as deeply as in *Taphozous*. Owing to the concavity of the frontal bones, the crown of the head appears much more elevated above the face-line than in *Emballonura*.

Range. South-east Africa (Zanzibar; Mozambique) to the Seychelle Islands and, probably, to Madagascar and other islands of the Malagasy Subregion.

Synopsis of the Species.

a. Lower lip with a distinct median groove in front; muzzle obtusely conical; ears narrowly rounded off above; forearm 2″·2; tibia 0″·95 ..... 1. *C. seychellensis*, p. 364.

b. Lower lip not divided by a groove in front; muzzle acutely conical; ears broadly rounded off above; forearm 1″·9; tibia 0″·6 ..... 2. *C. afra*, p. 365.

1. Colëura seychellensis.

Colëura seychellensis, *Peters, MB. Akad. Berl.* 1868, p. 367.

Ears much shorter than the head, their inner margins arising from the sides of the forehead at a short distance above and behind the eyes; inner margin of the ear-conch straight, tip narrowly rounded off; outer margin slightly convex, with a shallow emargination opposite the tragus, terminating midway between the base of the tragus and the angle of the mouth; tragus much longer than broad, inner and outer margins straight, parallel, the tragus maintaining the same width upwards, abruptly and shortly rounded off at the tip, a small projection on the outer side opposite the base

of the inner margin. Crown of the head slightly but abruptly raised above the flattened forehead; muzzle flat and broad above, the extremity projecting slightly beyond the lower lip, the nasal tubes not much raised above the muzzle; lower lip with a very distinct median groove, as in *Taphozous* (Plate XX. fig. 2).

Wings from the ankles; tibiæ very long; calcaneum about three fourths the length of the tibia; interfemoral very deep, tail projecting on its upper surface by the last caudal vertebra only.

Fur, above and beneath, dark brown, limited in a remarkable manner to the body, scarcely extending in any direction upon the wings, and leaving the interfemoral membrane altogether naked on its upper surface.

Upper incisors unicuspidate, small and weak, separated at their bases, their cusps converging and rather close together at their extremities; first upper premolar very small, in the tooth-row, scarcely raised above the gum, and almost invisible without the aid of a lens; lower incisors trifid, the central pair on each side slightly overlapping the others.

(The measurements are given at p. 366, where they are compared with those of the next species.)

Hab. Seychelle Islands; Zanzibar.

Type in the collection of the Berlin Museum.

a. ♂ ad., al.*	Seychelle Islands.	Dr. E. P. Wright [C.].
b. ♀ ad., al.	Zanzibar.	Capt. J. E. Parish [P.].

2. Colëura afra.

Emballonura afra, *Peters, Reise nach Mossambique, Säugeth.* p. 51, pls. xii., xiii. figs. 18, 19 (1852).
Colëura afra, *Peters, MB. Akad. Berl.* 1867, p. 479.

About the size of *C. seychellensis*; the ears the same length as in that species, but conspicuously wider above and more broadly rounded off; the form of the muzzle also quite different, viewed from beneath it appears acutely conical, the summit of the cone formed by the very prominent nostrils, which are also raised considerably above the surface of the muzzle, the extremity of which projects much beyond the lower lip; the lower lip is not divided by a median groove (Plate XX. fig. 3).

Wings from the ankles; calcaneum nearly as long as the tibia; tibia and interfemoral membrane much shorter than in *C. seychellensis*.

On the upper surface the fur of the body extends outwards upon the wing-membrane almost as far as a line drawn from the middle of the humerus to the distal third of the femur, and upon the interfemoral as far as the point of exit of the tail; beneath, the distribution of the hair is similar; a fringe of hairs, longer than in *C. seychellensis*, margins the upper lip.

Upper incisors as in *C. seychellensis*, but separated by a much

* One of the specimens from which the type of the species was taken.

wider interval, each placed in the centre of the space between the canine and the middle of the intercanine space; first upper premolar larger, nearly equal to the cingulum of the canine in vertical extent and visible to the naked eye; lower incisors not crowded.

Hab. Mozambique.

Type in the collection of the Berlin Museum.

In the following Table the measurements of this species are contrasted with those of *C. seychellensis*:—

	C. afra.	*C. seychellensis.*
Length, head and body	2·25	2·35
„ tail	0·65	0·65
„ head	0·85	0·85
„ ear	0.65	0·65
„ tragus	0·2	0·2
„ forearm	1·9	2·2
„ thumb	0·35	0·4
„ third finger, metacarpal	1·6	1·75
„ „ „ 1st phalanx	0·6	0·6
„ „ „ 2nd „	0·7	0·85
„ fourth finger, metacarpal	1·25	1·35
„ „ „ 1st phalanx	0·45	0·5
„ „ „ 2nd „	0·23	0·3
„ fifth finger, metacarpal	1·05	1·2
„ „ „ 1st phalanx	0·5	0·5
„ „ „ 2nd „	0·2	0·25
„ tibia	0·6	0·95
„ calcaneum	0·55	0·55
„ foot	0·45	0·45

a. ♀ ad., al.* Mozambique. Dr. Peters [C.].

5. RHYNCHONYCTERIS.

Proboscidea, *Spix, Simiar. et Vespertil. Bresil.* p. 62 (1823).
Rhynchonycteris, *Peters, MB. Akad. Berl.* 1867, p. 477.

Ears separate, ear-conch very narrow and attenuated above, with a rounded very distinct antitragus; tragus much longer than broad, rounded off above, slightly inclined inwards; upper extremity of the muzzle very much pointed and produced beyond the lower lip, nostrils opening by horizontal oval apertures; no sac in the antebrachial membrane; wings from the ankles; calcaneum considerably longer than the tibia; premaxillary bones much expanded at their bases; facial bones mesially concave; anterior margin of the orbit in the same vertical line with the first small premolar; dental formula as in *Saccopteryx*.

Range. Neotropical Region (Mexican and Brazilian Subregions).

This genus, which is represented by a single species only, appears to connect the group *Emballonuræ* with the group *Noctiliones*, resembling the genus *Noctilio* very closely in the form of the ear-conch, of the nasal apertures, and of the lower lip, and having almost the same geographical range.

* One of the specimens from which the type of the species was taken.

1. Rhynchonycteris naso.

Vespertilio naso, *Wied, Schinz, Thierreich*, Bd. i. p. 179 (1821); *Beitr. zur Naturgesch. Brasil.* Bd. ii. p. 274 (1826).
Proboscidea saxatilis *et* rivalis, *Spix, op. cit.* p. 62, pl. xxxv. fig. viii. (1823).
Emballonura lineata, *Temminck, Monogr. Mammal.* ii. p. 297 (1835–41), *vide Peters, l. c.* p. 478.
Rhynchonycteris naso, *Peters, l. c.*

Ears shorter than the head, very narrow above and subacutely pointed; inner margin of the ear-conch arising above the eye, slightly convex below, straight or faintly concave above to the tip, outer margin abruptly concave immediately beneath the tip, becoming slightly convex about the middle, with an acute emargination opposite the tragus, cutting off a well-defined circular antitragus, beyond which it terminates on a level with the angle of the mouth, but much nearer to the base of the tragus; tragus much longer than broad, slightly inclined forwards, rounded off narrowly above, the outer and inner margins slightly convex, no distinct lobule at the base of the outer margin. Upper extremity of the muzzle produced far beyond the canines and the lower lip (Plate XX. fig. 4), conical, pointed, terminated by the slightly projecting inner margins of the nasal apertures, which form long ovals placed horizontally, opening sublaterally, separated by a slightly concave space not equal in width to half the diameter of one nostril; lower lip with two prominent naked pendulous papillæ.

Calcanea much longer than the tibia, nearly equal to half the length of the forearm, their extremities projecting more than one tenth of an inch beyond the membrane; wing-membrane extending to the ankles or tarsus.

Above, dark brown, the extremities of the hairs greyish; beneath, dark brown at the base, the extremities grey, so that the whole under surface appears white.

The muzzle in front of the eyes is covered with short fur and a few long hairs, the inner side of the ear-conch is clothed with some greyish hairs; the antebrachial membrane is thinly covered with some short grey hairs, which are most abundant near the forearm, while similar hairs, arranged in small tufts, form a band on the wing-membrane along the forearm almost to the carpus; the fur of the body extends upon the wing-membrane as far as a line drawn from the distal third of the humerus to the knee, beyond this becoming very short and arranged in tufts along the oblique lines with which the membrane is marked; the interfemoral membrane is thinly covered with moderately long fur as far as a line connecting the ankles when the limbs are extended; beneath, the antebrachial membrane is naked, and the wing-membrane is clothed with soft grey fur as far as a line drawn from the elbow to the distal third of the humerus, beyond which it does not extend; nearly the whole of the inferior surface of the interfemoral is thinly covered with very short hairs.

Upper incisors very small and feeble, closer to each other than to the canines; lower incisors also very small, trifid, and in the direction of the jaws; upper canines with a prominent internal basal cusp; first upper premolar small, with an anterior basal cusp, close to the base of the canine, and removed from the second premolar by a space; in the lower jaw the premolars are similarly placed, but the second is narrow and long, and the anterior basal cusp is scarcely visible.

Length (of an adult ♂), head and body 1″·65, tail 0″·55, head 0″·6, ear 0″·5, tragus 0″·15, forearm 1″·4, thumb 0″·25; third finger—metacarp. 1″·35, 1st ph. 0″·45, 2nd ph. 0″·6; fourth finger—metacarp. 1″·1, 1st ph. 0″·3, 2nd ph. 0″·25; fifth finger—metacarp. 1″, 1st ph. 0″·3, 2nd ph. 0″·2; tibia 0″·5, calcaneum 0″·68, foot 0″·25.

Hab. Guatemala, Honduras, British Guiana; Surinam; Brazil: Peruvian Amazons.

This very remarkable small species, so easily distinguished by the great length of the extremity of the muzzle and by its narrow ears, is abundant in the vicinity of streams throughout the tropical parts of Central and South America. It is commonly found during day, resting on the vertical faces of rocks or on the underside of the slanting trunks of trees growing on the banks of rivers, so that the names used by Spix to designate the species, *Proboscidea saxatilis* et *rivalis*, are very appropriate. Its manner of resting on such smooth surfaces was first noticed by the writer when travelling in British Guiana in 1873. On the margin of a wide drain leading to the sea from some sugar-plantations, a square-cut post of the exceedingly hard "green-heart" wood had been driven obliquely into the ground, so that one side slightly overhung the water. To this smooth side a colony of about twelve individuals of *Rh. naso* were clinging, head downwards, with anterior and posterior extremities separated outwards, and the interfemoral membrane laid flat against the surface of the wood, so that they looked like so many pinned specimens of the genus *Papilio*, the separated legs resembling the tail-like projections from the posterior margins of the wings of these insects. So flatly did they adhere to the smooth surface of the wood, and so well did the greyish fur of their bodies and the small tufts of greyish hairs on the antebrachial membrane and on the wing-membrane on the outer side of the forearm counterfeit the weathered surface of the wood, that it was some time before the little colony could be distinguished by those to whom its hiding-place was pointed out.

As the shades of evening approach, even before the sun has touched the horizon, *Rh. naso* may be seen flitting rapidly along the streams, no doubt in search of small insects which either hover close to, or rest upon, the surface of the smooth water, the capture of which its projecting upper lip and downward direction of the opening of the mouth are peculiarly adapted to effect.

a. ♀ ad., al.	Honduras.	
b. ♀ ad., al.	Ysabel de Guatemala.	O. Salvin, Esq. [C.].

c. ♀ ad., al.	Demerara.	G. E. Dobson, M.B. [E.].
d. ♂ ad., al.	Surinam.	Dr. Peters [P.].
e. ♂ ad., al.	Surinam.	Mr. Bartlett [C.].
f–i. ♂ & ♀ ad., al.	Upper Amazons.	Mr. Bartlett [C.].
j, k. ad. sks.	Lake of Haulhaja, Santa Cruz, Peruvian Amazons.	Mr. Bartlett [C.].
l, m. ♀ ad., al.		

6. SACCOPTERYX.

Saccopteryx, *Illiger, Prodr. Syst. Mammal.* p. 121 (1811).
Taphozous, *Geoffroy* (in part), *Descript. de l'Egypte*, ii. p. 126 (1812).
Taphozous *et* Urocryptus, *Temminck* (in part), *Monogr. Mammal.* ii. pp. 294, 300 (1835–41).
Saccopteryx, Peropteryx, Cormura, Balantiopteryx, Centronycteris, *Peters, MB. Akad. Berl.* 1867, pp. 471–476, and 1872, p. 701.

Ear-conch very similar in general outline to that of *Emballonura*, but the tragus is never expanded above, generally slightly narrowed at the upper third; forehead flat or slightly concave; extremity of the muzzle projecting more or less beyond the lower lip, terminated by the circular nasal apertures, which are close together; *antebrachial membrane with a pouch opening on its upper surface*, well developed in males, rudimentary or absent in females; wings from the ankles or from the sides of the feet as far as the metatarsus; interfemoral membrane and tail as in *Emballonura*.

Dentition. Inc. $\frac{1-1}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Upper incisors feeble, unicuspidate, closer to each other than to the canines.

Range. Neotropical Region (Mexican and Brazilian Subregions).

The peculiar glandular sac in the antebrachial portion of the wing-membrane in the species of this genus, first noticed by Schreber in *S. leptura* *, has been subsequently described by Dr. J. E. Gray † and by Hr. Reinhardt ‡; and Dr. Peters has divided the genus *Saccopteryx* into several genera, mainly distinguished by the position of this sac, which in different species occupies different parts of the membrane.

The wing-sac is developed only in the male; in the female it is quite rudimentary, its position being indicated only by two small folds of skin, scarcely raised above the surface of the membrane, which correspond to the margins of the mouth of the sac in the male. In the adult males of the different species a valvular longitudinal opening is found on the upper surface of the antebrachial membrane. This opening leads into a small pouch (in some species large enough to hold a pea), which projects abruptly from the under surface of the membrane. The interior of this pouch is lined by a glandular membrane, which secretes an unctuous substance of a reddish colour, with a strong ammoniacal odour. In some species

* See p. 371 and footnote.
† Ann. & Mag. Nat. Hist. 1845, p. 279.
‡ *L. c.* 1849, p. 386.

the lining membrane is deeply wrinkled. The mouth of the sac is formed by two raised edges, whereof one is higher than the other, and when the wing is at rest lies over the other and closes the sac; but when the wing is extended the margins of the aperture are separated and the sac opened.

Reinhardt, who examined many specimens of *Saccopteryx canina*, both living and recently killed, remarks that the bag is provided with particular muscles, on the contraction of which it must open; for in the alar membrane are seen fine muscular fibres which run from the edges of the aperture in a direction parallel with the outer edge of the alar membrane, partly towards the body, partly towards the thumb.

The development of this alar glandular sac (peculiar to this genus) in males only indicates that it is a secondary sexual character, analogous to the throat-pouches of *Taphozous*, the frontal sacs of *Phyllorhina*, and other glandular organs found in the males only of many species of Chiroptera*, all of which secrete an oily substance of strong odour, which is probably of use in attracting the females.

Synopsis of Subgenera and Species.

a. Wing-sac opening along the forearm on the outer side of the antebrachial membrane; ears narrowed above, emarginate externally, tragus abruptly truncated above; wings from the tibiæ or from the ankles; premaxillary bones without internal oblique process, facial bones flattened; anterior margin of the orbit in a vertical line with the second upper premolar ..... Subg. SACCOPTERYX†.

α. No longitudinal streaks on the fur of the back; forearm about 1″·4 ..... 1. *S. leptura*, p. 371.

β. Two longitudinal streaks on the fur of the back; forearm about 1″·8 ..... 2. *S. bilineata*, p. 372.

b. Wing-sac opening near the anterior margin of the antebrachial membrane, aperture directed outwards; ears triangular, rounded, close together or united by a band across the face; tragus rounded off above; wings from the tibia or from the tarsus; premaxillary bones with an internal oblique process; facial bones mesially hollowed, laterally expanded above in front of the orbits; anterior margin of the orbit in the same vertical line with the middle of the second premolar .... Subg. PEROPTERYX‡.

γ. Ears separate; wings from the distal end of the tibiæ; forearm 1″·8 ..... 3. *S. canina*, p. 373.

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* See my paper "On Secondary Sexual Characters in Chiroptera," in P. Z. S. 1873, pp. 241–252.

† Genus *Saccopteryx*, Ptrs. *l. c.*

‡ Genus *Peropteryx*, Ptrs. *l. c.*

b. Ears united; wings from the tarsus; forearm 1″·7. (Subg. *Peronymus*, Ptrs.) .. 4. *S. leucoptera*, p. 374.

c. Wing-sac opening in the centre of the antebrachial membrane, the aperture directed inwards; in other respects as in subg. *Peropteryx* ..... Subg. BALANTIOPTERYX*.

e. The posterior edge of the wing-membrane margined with white; forearm 1″·7 ..... 5. *S. plicata*, p. 376.

d. Wing-sac opening on the inner side of the antebrachial membrane near the shoulder; ears separate; wings from the base of the toes; premaxillary bones very small; facial bones flattened above, with a longitudinal central groove..... Subg. CENTRONYCTERIS.

f. Ears slightly longer than the head; forearm 1″·75 ..... 6. *S. calcarata*, p. 376.

1. Saccopteryx leptura.

Vespertilio lepturus, *Schreber, Säugeth.* i. p. 173, pl. 57 (1775).
Saccopteryx lepturus, *Illiger, Prodr. Syst. Mammal.* p. 121 (1811); *Krauss, Erichson's Archiv für Naturgesch.* 1846, p. 178, fig. 6.
Saccopteryx leptura, *Peters, MB. Akad. Berl.* 1867, p. 471.

Head scarcely raised above the face-line; eyes large; nose prominent, raised above the muzzle and projecting slightly in front, with a narrow but distinct groove above between the nostrils; nasal apertures opening close together in front, directed forwards, downwards, and slightly outwards; extremity of the muzzle projecting slightly beyond the lower lip; lower lip with a vertical groove in front. Ears narrow, somewhat shorter than the head; inner margin of the ear-conch arising slightly above the eye, convex in lower, straight in upper two thirds, tip narrowly rounded off, outer margin deeply concave in upper one third, then convex, slightly concave opposite the base of the tragus, terminating midway between the base of the tragus and the angle of the mouth in a slightly convex lobe; tragus longer than broad, inner margin straight or slightly concave, outer margin with an indistinct triangular lobe above the base, then straight, slightly convex above, with small, rounded, bead-like projections, tip rounded off.

Antebrachial membrane in male with a deep pouch, the mouth of which extends along the forearm from a point near the anterior and outer margin of the membrane backwards and inwards towards the elbow, 0″·3 inch in length†; in the female this sac is quite rudimentary. The interior of the sac is lined with a glandular membrane, which is deeply wrinkled, and contains an unctuous substance.

Wings from the ankles or tarsi; interfemoral membrane very large, extending, when expanded, to a considerable distance beyond the feet; calcaneum as long as the tibia.

* Genus *Balantiopteryx*, Ptrs. *l. c.*

† See an excellent representation of this sac, viewed from the under surface of the antebrachial membrane, in Schreber, Säugethiere, i. pl. lvii.

Fur dark brown or black above, the extreme tips of the hairs greyish; beneath, similar but paler.

On the upper surface the wing-membrane is densely covered as far as a line drawn from the distal third of the humerus to the knee, the fur terminating by a sharply defined margin; on the interfemoral as far as the extremity of the tail, the femur and part of the tibia being also covered; the feet are naked. Beneath, the wing-membrane is similarly covered, but the fur is finer and less densely spread; the whole of the interfemoral is clothed with short fine hairs.

Upper incisors very slender and acutely pointed; one incisor on each side in the centre of the space between the canine and the middle line; lower incisors trifid, in the direction of the jaws; upper canine with an acute basal cusp in front and behind, separated from the second premolar by a rather wide space, in the anterior part of which, close to the base of the canine and slightly external, the first minute premolar is placed; second premolar large, with an anterior basal cusp; first lower premolar triangular, short, with a blunt basal cusp projecting from the cingulum in front and behind,

Length, head and body 1″·55, tail 0″·6, head 0″·55, ear 0″·5, tragus 0″·12, forearm 1″·4, thumb 0″·23; third finger—metacarp. 1″·35, 1st ph. 0″·5, 2nd ph. 0″·7; fourth finger—metacarp. 1″·2, 1st ph. 0″·3, 2nd ph. 0″·35; fifth finger—metacarp. 1″·15, 1st ph. 0″·32, 2nd ph. 0″·22; tibia 0″·6, calcaneum 0″·6, foot 0″·28.

Hab. Surinam; Brazil (Para, Santarem).

a.	♂ ad., al.	Surinam.	Mr. Bartlett [C.].
b.	♂ ad., al.	Para.	R. Graham, Esq. [P.].
c.	♂ ad., al.	Santarem.	Mr. Wickham [C.].

2. Saccopteryx bilineata.

Urocryptus bilineatus, *Temminck, Van der Hoeven, Tijdsch. Natuurgesch.* p. 33, figs. 3, 4 (1839); *Monogr. Mammal.* ii. p. 301 (1835–41).

Emballonura bilineata, *Wagner, Suppl. Schreb. Säugeth.* v. p. 694 (1855).

Saccopteryx bilineata, *Peters, MB. Akad. Berl.* 1867, p. 471.

In the form of the head and ears, and in the position and structure of the wing-sac very similar to the preceding species, from which, however, it is distinguished by its much greater size and by the presence of two white longitudinal streaks on the back.

The sac in the antebrachial membrane is remarkably large (in male specimens), its mouth occupying a space on the upper surface of the membrane along the second quarter of the forearm, being 0″·45 inch long, leading into a deep sac, the concavity of which is marked with numerous longitudinal wrinkles; in females the sac is present in the same position, but is very small, and the longitudinal wrinkles are absent.

Wings from the tarsus; calcaneum and interfemoral membrane as in *S. leptura*.

Fur, above, dark brown, with two longitudinal streaks of white along the centre of the back; beneath, brown, the extreme tips ashy. Distribution as in the preceding species.

The teeth are quite similar to those of *S. leptura*.

Length (of an adult ♂), head and body 2″, tail 0″·8, ear 0″·7, tragus 0″·2, forearm 1″·85, thumb 0″·33; third finger—metacarp. 1″·7, 1st ph. 0″·6, 2nd ph. 0″·95; fifth finger 2″·1, tibia 0″·9, foot 0″·4.

Hab. Surinam.

It appears to me very doubtful whether this can be considered a species distinct from *S. leptura*. It is more probably a large variety of that species with more distinct white lines along the back, for even in typical examples of *S. leptura* two faint white lines can be occasionally traced. I am, however, unable to settle this question owing to insufficiency of material to work upon, and therefore prefer for the present to recognise two species in accordance with the views of other zoologists, and especially in deference to those of Prof. Peters, who has worked out this group with great care.

a. ♀ ad. sk.	Forest, Santa Lucia, Pacific coast of Guatemala.	O. Salvin, Esq. [C.].
b. ♀ ad. sks.	Vera Paz, Guatemala.	O. Salvin, Esq. [C.].
c–g. ♂ imm. & ad. sks.	Bogota.	O. Salvin, Esq. [C.].
h. ♀, ? ad. sk.	Para.	R. Graham, Esq. [P.].

3. Saccopteryx canina.

Vespertilio caninus, *Wied, Beitr. zur Naturgesch. Brasil.* Bd. ii. p. 262 (1826).

Emballonura canina, *Temminck, Van der Hoeven, Tijdsch. Natuurgesch.* p. 29 (1839): *Monogr. Mammal.* ii. p. 298 (1841); *Wagner, Abhandl. Münch. Akad.* v. p. 151, pl. iii. figs. 5 (head), 6 & 7 (wing-sac); *Burmeister, Thiere Brasiliens, Säugeth.* p. 63 (1854).

Emballonura macrotis, *Wagner, Wiegm. Archiv*, 1843, p. 367; *Abhandl. Münch. Akad.* v. p. 189, pl. iii. figs. 8–10 (vide *Peters, MB. Akad. Berl.* 1867, p. 472).

Emballonura brunnea, *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 66, pl. xv. fig. 2 (teeth) (1855).

Peropteryx canina, *Peters, l. c.* p. 472.

Head and muzzle as in *S. leptura*, except that the nose is not so prominent above the face, although the extremity of the muzzle projects to a greater extent beyond the lower lip. Ears as long as the head, much broader than in *S. leptura*; the inner margin of the ear-conch arises abruptly from the face above the anterior angle of the eye, from which it is separated by a prominent wart, straight or slightly concave in its lower third, then convex, succeeded by a slight concavity, becoming again convex towards the tip, which is rounded off; outer margin straight or slightly convex from the tip to a point opposite the base of the inner margin of the tragus, where a well-marked emargination occurs, then forming a large slightly convex lobe, which terminates abruptly midway between the base of the tragus and the angle of the mouth, but on a lower level: tragus

as in *S. leptura*, except that there is no triangular lobe above the base of the outer margin, and the extremity is narrower above.

Antebrachial pouch in the centre of the anterior half of the upper surface of the membrane; aperture directed outwards, commencing at the anterior free margin and extending backwards towards the elbow-joint as far as the centre of the membrane; the sac much smaller than in *S. leptura*, scarcely projecting on the inferior surface of the membrane, and its cavity is not marked with such deep plications of the lining membrane; in the female the position of the mouth is alone marked by a slight reduplication of the membrane.

Wings from the ankles; calcaneum and interfemoral membrane as in *S. leptura*; the last caudal vertebra projecting on the upper surface of the membrane.

Fur dark brown above, paler beneath, not extending upon the membranes so far or so densely as in *S. leptura*.

Length, head and body 2″, tail 0″·6, head 0″·7, ear 0″·7, tragus 0″·2, forearm 1″·8, thumb 0″·3; third finger—metacarp. 1″·55, 1st ph. 0″·55, 2nd ph. 0″·95; fourth finger—metacarp. 1″·3, 1st ph. 0″·35, 2nd ph. 0″·35; fifth finger—metacarp. 1″·2, 1st ph. 0″·45, 2nd ph. 0″·25; tibia 0″·75, foot 0″·35.

Hab. Central America (Guatemala, Coban); Venezuela; British Guiana; Brazil (Atacamis).

a, b. ♀ ad., al.	Coban, Central America.	O. Salvin, Esq. [C.].
c. ♀ ad. sk.	Atacamis.	Capt. Kellett and Comm. Wood [P.].
d–e. ♀ ad., al.		Haslar Hospital Coll.
f. skeleton.		Haslar Hospital Coll.

Var. *a*. (*Saccopteryx kappleri*.)

Peropteryx kappleri, *Peters, MB. Akad. Berl.* 1867, p. 473.

I have examined the type of *Peropteryx kappleri*, Ptrs., which is preserved in the Berlin Museum, and can find no difference, except in size, between it and *S. canina*.

As the differences in size consist in the greater length of the extremities (see below), it appears to me to be either an old individual (as Dr. Peters suspects) or a local variety.

Length, head and body 2″·1, tail 0″·6, ear 0″·7, tragus 0″·2, forearm 2″, thumb 0″·3; third finger—metacarp. 1″·75, 1st ph. 0″·55, 2nd ph. 1″; fifth finger 2″·1, tibia 0″·8, foot 0″·4.

Hab. Surinam.

4. Saccopteryx leucoptera.

Peropteryx leucoptera, *Peters, MB. Akad. Berl.* 1867, p. 474.
Peropteryx (Peronymus) leucoptera*, *Peters, l. c.* 1868, p. 145.

Ears united across the face by a low band about one tenth of an inch high in the centre; inner margin of the ear-conch straight,

* Made the type of a new subgenus, *Peronymus*, by Peters, on account of the united condition of the ears, and the position of attachment of the wings to the feet.

outer margin convex above, concave opposite the base of the tragus, and terminating in a large slightly convex lobe, as in *S. canina*; tragus with straight sides and broadly rounded-off extremity, the outer and upper margins irregularly toothed. Muzzle and nostrils as in the preceding species.

Wing-sac as in *S. canina*; wings from the tarsus or metatarsus; free margin of the interfemoral membrane straight behind between the extremities of the calcanea.

Fur dark brown above, slightly paler beneath; wing-membrane, between the body and a line drawn from the elbow to the knee, white, translucent, with small black dots corresponding to the position of hairs, the remaining parts of the integuments dark brown. On the upper surface the wing-membrane is thinly covered as far as a line drawn from the middle of the humerus to the knee, and the interfemoral as far as the point of exit of the tail; beneath, as far as a line drawn from the proximal third of the humerus to the junction of the thigh with the body; the under surface of interfemoral clothed with short fine hairs.

Dentition as in the preceding species.

Length, head and body 2″, tail 0″·5, ear 0″·65, tragus 0″·2, forearm 1″·7, thumb 0″·3, third finger—metacarp. 1″·5, 1st ph. 0″·45, 2nd ph. 0″·9; fifth finger 1″·8, tibia 0″·6, foot 0″·35.

Hab. Surinam.

Type in the collection of the Berlin Museum.

The following genus has been founded on the *Emballonura brevirostris* of Wagner, the type of which consists of a single badly-preserved female specimen in the Vienna Museum, from which it is impossible to determine whether a wing-sac exists or not.

CORMURA.

Cormura, *Peters, MB. Akad. Berlin*, 1867, p. 475.

CORMURA BREVIROSTRIS.

Emballonura brevirostris, *Wagner, Wiegm. Archiv*, 1843, p. 367; *Abhandl. Münch. Akad.* v. p. 187; *Suppl. Schreb. Säugeth.* v. p. 696 (1855).
Cormura brevirostris, *Peters, MB. Akad. Berl.* 1867, p. 475, pl. figs. 1, 1*b*.

Ears much shorter than the head; ear-conch triangular, with broadly rounded-off vertical angle; inner margin faintly convex; outer margin straight, emarginate opposite the base of the tragus, and terminating in a convex lobe midway between the tragus and the angle of the mouth: tragus erect, maintaining almost the same breadth from the base of the inner margin to the tip, which is abruptly truncated; outer margin with a small lobe near the base.

Wings from the metatarsus; calcaneum shorter than the tibia.

Above reddish brown, with paler extremities, beneath similar, but paler; the hair at the base of the ears and on the middle of the occiput whitish, and that of the shoulders near the spine pure white at the base.

The skull is much shorter in the facial portion than in any of the preceding species, the frontal bones are less flattened, and the crown of the head more elevated. The teeth are also larger, and in consequence of this, and of the shortness of the facial portion of the skull, the small first upper premolar almost fills up the space between the canine and the second premolar; upper incisors very small and feeble, lower incisors trilobate.

Length, head and body 1″·9, tail 0″·3, ear 0″·37, forearm 1″·8, thumb 0″·23; third finger—metacarp. 1″·55, 1st ph. 0″·55, 2nd ph. 0″·9; fifth finger 2″,

5. Saccopteryx plicata.

Balantiopteryx plicata, *Peters, MB. Akad. Berl.* 1867, p. 476.

Nostrils more like those of *Taphozous* than the preceding species; apertures directed slightly outwards, no furrow or groove between them above. Inner margin of the ear-conch straight, tip shortly rounded off; outer margin straight or slightly convex, scarcely concave opposite the base of the tragus, terminating on a level with the angle of the mouth directly below the posterior margin of the eye: tragus straight, outer margin slightly convex, with a projecting tooth near its base; inner margin straight, tip narrowly rounded off or obtusely pointed.

Wing-sac in the centre of the antebrachial membrane, opening directed inwards and upwards; quite rudimentary in females.

Wings from the ankles; interfemoral membrane concave between the extremities of the calcanea.

Fur dark brown above, paler beneath; volar membranes dark brown, the wing-membrane margined with a narrow white line extending from the ankles to the extremity of the fourth finger. Above, the fur of the body extends upon the wing-membrane as far as a line drawn from the middle of the humerus to the distal third of the femur, and fine short hairs clothe the upper surface of the interfemoral as far as the end of the tail, and on the inferior surface are arranged along the transverse lines with which it is marked.

Teeth as in *S. canina*.

Length (of the type specimen, an adult ♂), head and body 1″·8, tail 0″·7, ear 0″·55, tragus 0″·2, forearm 1″·7, thumb 0″·28; third finger—metacarp. 1″·4, 1st ph. 0″·45, 2nd ph. 0″·65; fifth finger 1″·7, tibia 0″·7, foot 0″·35.

Hab. Costa Rica (Puntarenas).

Type in the collection of the Berlin Museum.

6. Saccopteryx calcarata.

Vespertilio calcaratus, *Wied, Schinz, Thierreich*, i. p. 180 (1821); *Wied, Beitr. zur Naturgesch. Brasil.* Bd. ii. p. 269 (1826).

Centronycteris calcarata, *Gray, Mag. Zool. & Bot.* ii. p. 499 (1838) (*not Voy. of the 'Sulphur'*); *Peters, MB. Akad. Berl.* 1867, p. 478, 1872, p. 702.

Ears somewhat longer than the head, narrowed above; outer margin of the ear-conch with two emarginations, a larger one in

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tibia 0″·6, foot 0″·3, skull 0″·6, tooth-row 0″·25, distance between the upper canines 0″·12.

Hab. Brazil.

The above description is taken from Dr. Peters's notes on the type of this species, which is preserved in the Vienna Museum. The type consists of a single badly-preserved female specimen, so that it is quite uncertain whether a wing sac exists in the male or not. As this species, however, agrees in most respects with the species of the genus *Saccopteryx*, I prefer to consider it a member of that genus.

the upper half, and a smaller above the slightly developed antitragus. Tragus with two slight emarginations on its outer side, and abruptly truncated above, about double as high as broad, maintaining almost the same width upwards. Nasal apertures obliquely oval, directed forwards, opening close to the margin of the upper lip, separated one from the other by a space equal to the width of one nostril; upper lip with a central small wart-like prominence lying directly beneath the space between the nostrils; muzzle rather broad and gradually flattened; lower lip with a raised naked space in front divided by a vertical groove.

Wings from the base of the toes; antebrachial membrane with a small flattened elevation (in the female) on the side near the shoulder.

Fur reddish brown above, paler beneath, the hairs dark brown at the base; volar membranes dark brown.

Above, the wing-membrane is clothed as far outwards as a line drawn from the proximal third of the humerus to the same part of the femur; the interfemoral membrane is covered as far as the end of the tail, beneath more thinly; but almost the whole surface is covered with short stiff hairs arranged along the transverse lines.

Premaxillary bones very small; frontal bones flattened, with a central longitudinal groove; auditory *bullæ osseæ* large, approximated.

Dental formula as in *Saccopteryx*.

Length, head and body 2″·2, tail 0″·8, head 0″·75, ear 8″, tragus 0″·23, forearm 1″·75, thumb 0″·26; third finger—metacarp. 2″, 1st ph. 0″·85, 2nd ph. 1″·3; fourth finger—metacarp. 1″·65, 1st ph. 0″·42, 2nd ph. 0″·44; fifth finger—metacarp. 1″·5, 1st ph. 0″·44, 2nd ph. 0″·3; tibia 0″·7, calcaneum 0″·65, foot 0″·3.

Hab. Brazil (Rio do Espirito Santo); Peru.

The above is taken from Dr. Peters's description of a female specimen of this species from Peru, which he had compared with the type of *Vespertilio calcaratus*, Wied*, also a female specimen and in bad condition. These are the only specimens of this species as yet obtained, and it is therefore impossible to say to what extent a wing-sac exists in the male; but the flattened elevation on the inner side of the antebrachial membrane in the female (described above) is evidently the rudiment of the wing-sac, which I believe will be found in the male.

Dr. Peters, considering this species the type of a distinct genus, remarks, that in the form of the ears and tragus, and in the general structure of the skull, it approaches the section of which *Saccopteryx leptura* is typical, whilst in the much broader mesopterygoid fossa, and the weaker zygomatic arches, it is more closely related to *Peronymus* [*Saccopteryx* (*Peropteryx*) *leucoptera*] and to *Rhynchonycteris*.

Centronycteris calcarata, Gray (Voyage of the 'Sulphur 1844, p. 69),= *Emballonura semicaudata*, Wied, as the specimen in the collection hows (*vide antea*, p. 361).

7. TAPHOZOUS.

Taphozous, *Geoffroy, Descript. de l'Egypte*, ii. p. 126 (1812); *Temminck, Monogr. Mammal.* ii. p. 277 (excl. *Taphozous lepturus*, Geoffr. et Temm.), 1835–41; *Dobson, P. Z. S.* 1875, p. 546; *id. Monogr. Asiat. Chiropt.* p. 106 (1876).

Muzzle very conical, broad behind, very narrow in front, terminated by the slightly projecting inner margins of the valvular nostrils. Crown of the head very slightly raised above the face-line; a deep frontal excavation between the eyes; ears separate, the inner margin of the conch arising by a short band from the side of the frontal concavity, the outer margin of the conch commencing in a small lobe close to the angle of the mouth, but on a lower level; tragus short, narrowest opposite the base of its inner margin, expanded above; lower lip as long or slightly longer than the upper lip, terminating in front in two small triangular naked spaces separated by a more or less deep groove; eyes rather large, a distinct horizontal groove on the face beneath; thumb with a small but very acute claw; first phalanx of middle finger folded (in repose) on dorsum of metacarpal bone; foot long and slender, the outer toe as long as the middle toe, the inner toe shortest; tail perforating the interfemoral membrane and appearing on its upper surface, capable of being partially withdrawn.

Dentition. Inc. $\frac{1-1}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Premaxillaries cartilaginous, supporting a pair of small weak incisors, often absent in adult animals; canines rather close together, much curved forwards, separated from the second premolar by a wide space, in which the first minute premolar scarcely appears above the level of the gum; second upper premolar exceeding the molars in vertical extent; last molar consisting of a narrow transverse bony lamina; mesopterygoid fossa very narrow, the pterygoid plates terminating in long hamular processes; immediately behind, the basisphenoid is deeply excavated on either side of a narrow longitudinal bony ridge which connects the roof of the mesopterygoid fossa with the basioccipital, the excavations forming corresponding elevations on the floor of the brain-case; postorbital processes very long, connected by ligament with the zygoma, and thus completely circumscribing the orbit.

Most of the species of this genus have a peculiar glandular sac placed between the angles of the lower jaw—a sexual character; for, while always more developed in males than in females, in some species while distinct in the male it is quite absent in the female. The width of the opening of the sac is nearly equal to half the distance between the angles of the jaw; and the direction of the opening is anterior. This open *gular sac* is quite absent in both sexes in *T. melanopogon*, but about its usual position the openings of small pores may be seen, the secretion exuding from which probably causes the hairs in this situation to grow very long, forming the black beard found in many male specimens of this species.

In the greater number of species, also, a small band of integument passes from the inferior surface of the forearm near its distal extremity to the proximal extremity of the fifth metacarpal bone, forming with the wing-membrane a small pouch—the *radio-metacarpal pouch*.

Range. Ethiopian, Oriental, and Australian Regions. One species extends into Egypt and Palestine, and none have as yet been found eastward of New Guinea or Australia.

Synopsis of Subgenera and Species.

I. Radio-metacarpal pouch distinct; lower lip scarcely grooved ..... Subg. TAPHOZOUS.
  a. Radio-metacarpal pouch well developed.
    a'. No gular sac in male or female.
      a''. Fur of the back extending upon part of the wing- and interfemoral membranes; extremity of tail thickened; forearm 2″·5 ..... 1. *T. melanopogon*, p. 380.
      b''. Fur of the back very narrow across loins, not extending upon the membranes; extremity of tail not thickened; forearm 3″ ..... 2. *T. theobaldi*, p. 381.
    b'. Gular sac present in males, rudimentary or absent in females.
      c''. Gular sac quite absent in females, throat hairy beneath.
        a'''. Ears as long or longer than the head; forearm 2″·7 ..... 3. *T. australis*, p. 382.
        b'''. Ears shorter than the head; forearm 2″·4..... 4. *T. perforatus*, p. 383.
      d''. Gular sac rudimentary in females, throat naked beneath.
        c'''. Fur brown above and beneath; forearm 2″·45 ..... 5. *T. longimanus*, p. 384.
        d'''. Fur brown above and beneath neck; chest and abdomen pure white; forearm 2″·4 ..... 6. *T. mauritianus*, p. 386.
  b. Radio-metacarpal pouch small; fur very short, not extending to membranes; forearm 2″·95 ..... 7. *T. nudiventris*, p. 387.

II. No radio-metacarpal pouch; lower lip divided in the centre of its upper surface and in front by a deep narrow groove .. Subg. TAPHONYCTERIS.
  a. Ears broadly rounded off above; inner margin smooth, slightly convex above; forearm three inches or less.
    a'. Gular sac developed (but smaller) in female also; fur dark brown above and beneath ..... 8. *T. saccolæmus*, p. 388.
    b'. Gular sac rudimentary in female, the margins alone developed; fur brown above, pure white beneath ..... 9. *T. affinis*, p. 389.
  b. Ears triangular, narrowly rounded off above; inner margin papillate; forearm three and a half inches at least ..... 10. *T. peli*, p. 390.

I. *Radio-metacarpal pouch distinct; lower lip scarcely grooved.*
Subgenus 1. TAPHOZOUS.

1. Taphozous melanopogon.

Taphozous melanopogon, *Temm. Monogr. Mammal.* ii. p. 287 (1835–41); *Wagner, Suppl. Schreb. Säugeth.* v. p. 687; *Cantor, Journ. Asiat. Soc. Beng.* xv. p. 180; *Dobson, Proc. Asiat. Soc. Beng.* Aug. 1872, p. 153; *P. Z. S.* 1875, p. 549, fig. 2; *Monogr. Asiat. Chiropt.* p. 167 (1876).
Taphozous bicolor, *Temm. l. c.* p. 290.
Taphozous philippinensis, *Waterhouse, P. Z. S.* 1845, p. 9.

No gular pouch; the openings of small pores appearing beneath the fur covering the inferior surface of the lower jaw between its angles; in some male specimens the hair in this situation is very long, forming a dense black beard*. Radio-metacarpal pouch large.

Wings from the tibiæ above the ankles.

The fur of the head extends upon the face as far as a line joining the inner corners of the eyes; the inner side of the ear-conch is covered with a few hairs; posteriorly the ears are clothed at their bases, naked above except where a row of fine hairs fringe the outer margin.

On the upper surface the fur of the body extends upon the wing-membrane about one third the length of the humerus and femur, the remainder of the wing- and antebrachial membranes are quite naked; posteriorly the interfemoral is covered thinly almost as far as the point where the tail perforates it; inferiorly, the fur of the body extends outwards upon the wing-membrane as far as a line joining the middle of the humerus and femur; beyond this, as in other species, a band of very short fine hair extends along the posterior margin of the forearm to the carpus; the feet are naked, except where a few hairs arise at the base of the claws on the backs of the terminal phalanges of the toes.

Above, the fur is white at the base, then dark brown, the extreme tips slightly greyish; beneath, white at the base, then paler brown than on the upper surface, the extreme tips greyish. In some specimens the white at the base of the hairs beneath is not well marked.

The black beard is not always developed in the males; its development seems to depend on certain conditions as yet not known; probably it appears periodically during the rutting-season. In five male specimens in the Indian Museum this beard is well developed, while out of over one hundred specimens received by M. Milne-Edwards from Cochin China, examined by me in the Paris Museum, two only possessed the beard.

The females of this species (in which neither the black beard nor pore-openings are developed) resemble those of *T. longimanus*; they are readily distinguished, however, by the absence of the rudimentary gular sac, and by the under surface of the lower jaw being

* See figure in P. Z. S. referred to above.

well clothed with hair, by the larger ears, and especially by the tail, which is thickened and somewhat laterally compressed towards the tip, though in every other species of the genus it tapers slightly towards its extremity, and also by the colour of the fur.

Length, head and body 3″·1, tail 1″, ear 0″·85, tragus 0″·23, forearm 2″·5, thumb 0″·35; third finger—metacarp. 2″·2, 1st. ph. 0″·8, 2nd ph. 0″·9; fifth finger 2″·1, tibia 0″·9, foot 0″·5.

Hab. India (Lower Bengal, Madras, Malabar coast); Burma; Pinang; Pulo Tickus; Cochin China; Java; Borneo; Philippine Islands.

Type in the collection of the Leyden Museum.

a. ad. sk.	Caves of Kennara, Malabar coast of India.	East India Comp. [P.].
b, c. ♂ imm. et ad., al.	Tenasserim Province.	Dr. Oldham [P.].
(The older male specimen with well-developed black beard.)		
d. ad. sk.	Pinang.	East India Comp. [P.].
e. ad. sk.	Pulo Tickus.	Dr. Cantor [C.].
f. ♂ ad., al.	Cochin China.	G. E. Dobson, M.B. [E.].
g, h. ♂ ad., al.	Borneo.	L. L. Dillwyn, Esq. [P.].
i–n. ♂ & ♀ ad., al.	Borneo?	Capt. Sir E. Belcher [C.].
o–q. ♂ & ♀ ad., al.	Philippine Islands.	Mr. Cuming [C.].
r–u. ♂ & ♀ ad., al.	Philippine Islands.	Zool. Soc. Coll.
(Types of *Taphozous philippinensis*,		Waterhouse.)
v. ad. sk.		Purchased.

2. Taphozous theobaldi.

Taphozous theobaldi, *Dobson, Proc. Asiat. Soc. Beng.* Aug. 1872, p. 152; *P. Z. S.* 1875, p. 550; *Monogr. Asiat. Chiropt.* p. 168 (1876).

Gular sac absent in both sexes. Inner margin of the ear papillate; ears larger than in any of the species of *Taphozous*. Radiometacarpal pouch well developed, larger than in *T. melanopogon*.

Wings from the tibiæ above the ankles.

The fur of the head extends upon the face as far as a line drawn between the inner corners of the eyes, the remainder of the muzzle is nearly naked; ear-conch naked, except where a few hairs clothe the basal portion of its inner surface; posteriorly the ears are naked except at the base and along their outer margins.

On the upper surface the wing- and interfemoral membranes are quite naked, the fur being strictly limited to the body; laterally the limit of the fur upon the back is defined by a well-marked line, convex *inwards* in the lumbar region; in *T. melanopogon* and in *T. nudiventris* the line of fur is convex *outwards* in the same situation; so that in this species the space occupied by fur in the lumbar region is narrower than in any of the other species, and appears to depend on the position of attachment of the wing-membrane. The tail has but three or four long, very fine hairs.

Inferiorly, the chin is naked as far as the anterior prolongation of the external margin of the ears; the fur of the body extends upon the wing-membrane as far as a line joining the middle of the humerus

and femur; from this a band of fine hairs extends outwards to the carpus; the interfemoral membrane is naked; the backs of the toes are covered with very short hairs.

Upper incisors very short and blunt.

Length, head and body 3″·35, tail 1″·35, head 1″·15, ear (anteriorly) 1″·1, tragus 0″·28, forearm 3″, thumb 0″·45, third finger 4″·7, fifth finger 2″·5, tibia 1″·15, calcaneum 0″·9, foot 0″·65.

Hab. Tenasserim Province.

Type in the collection of the Indian Museum, Calcutta.

3. Taphozous australis.

Taphozous australis, *Gould, Mammals of Australia* (1853); *Wagner, Suppl. Schreb. Säugeth.* v. p. 690; *Dobson, P. Z. S.* 1875, p. 550.

A distinct but rather small throat-sac in males, in females quite absent, the chin being covered with hairs in the position occupied by the throat-sac in the males. Ears large, as long as the head, inner margin of the ear-conch papillate; no lobule at the base of the tragus. Radio-metacarpal pouch well developed.

Wings from the ankles or tarsus. Tail slender.

The face is everywhere covered with hair, which in front of the frontal depression is very short. The fur of the back extends for a short distance upon the wing-membrane, and upon the interfemoral as far as the point perforated by the tail: the remaining part has a few short hairs. Beneath, the wing-membrane is densely covered as far as a line drawn from the middle of the humerus to the knee, the limit of the fur being strictly defined as in *T. melanopogon*. As in other species, a band of fur passes outwards behind the forearm to the carpus.

Fur above and beneath pure white at the base, the remaining three fourths of the hairs above dark brown, and terminal half beneath paler brown. The fur of the body rather long and dense.

Length, head and body 3″, tail 1″·3, ear 0″·95, tragus 0″·28, forearm 2″·7, thumb 0″·4; third finger—metacarp. 2″·5, 1st ph. 0″·8, 2nd ph. 1″·1; fifth finger 2″·45, tibia 1″·05, calcaneum 0″·8, foot 0″·45.

Hab. Australia, from Cape York to King George's Sound; New Guinea.

a. ♂ ad., al.	New Guinea.	Mrs. Stanley [P.].
b, *c*. ad. sks.	Albany Island, Cape York.	Voy. of 'Rattlesnake.'
d. ♀ ad., al. (type).	King George's Sound.	Dr. Richardson [P.].

3 *a*. Taphozous flaviventris.

Taphozous flaviventris (*Gould*), *Peters, P. Z. S.* 1866, p. 430.
Taphozous australis, var. flaviventris, *Dobson, P. Z. S.* 1875, p. 551.
? Taphozous hargravei, *Pierson-Ramsay, Proc. Linn. Soc. New South Wales*, 1876, p. 81.

I have not had an opportunity of examining the single specimen on which this species was founded, and the following description

by Dr. Peters is not sufficient to permit me to include it in the synopsis of the species :—

"Above black-brown; beneath pale ochraceous yellow; hair unicolor, the hairs on the belly whitish at the base; wings blackish, at the posterior margin whitish. Male with a large fossa between the hinder parts of the branches of the lower jaw; ears rounded, externally slightly emarginate; tragus as long as high, securiform; wings on the dorsal side naked, on the underside, above and below the arm-bones, woolly; femora on the dorsal side naked, on the ventral side covered with a thin woolly fur, which descends on the base of the interfemoral membrane. Also the point of the tail shows some hair.

"Total length, about 0·130 metre, length of head 0·035, ear 0·018, breadth of ear 0·011, length of tail 0·025, forearm 0·075, first finger 0·014, second finger 0·074, third finger 0·144, fourth finger 0·087, fifth finger 0·072, tibia 0·028, foot (with claws) 0·016, spur 0·033.

"This species, represented by a single male, submitted to my examination by Mr. Gould, is, although nearly related to *T. australis*, Gould, different in colour and in its superior size."

Hab. Australia.

Taphozous hargravei, Pierson-Ramsay, appears to be identical with this species. The measurements agree very closely, and the only difference of importance is the stated absence of the gular sac, which, however, the describer seems to be not thoroughly certain of, as the skin from which the description was taken was in bad condition.

4. Taphozous perforatus.

Taphozous perforatus, *Geoffroy, Descript. de l'Egypte*, ii. p. 126; *Temm. Monogr. Mamm.* ii. p. 281; *Wagner, Suppl. Schreb. Säugeth.* v. p. 684; *Dobson, P. Z. S.* 1875, p. 551.

Gular sac in males large, in females quite absent, chin hairy beneath; ears shorter than the head, inner margin faintly papillate. Radio-metacarpal pouch well developed.

Wings from the tibiæ, about a quarter of an inch above the ankles. Extremity of the tail attenuated.

Fur short, dark brown above and beneath, extending on both surfaces of the wing-membrane from the middle of the humerus to the middle of the femur, on the interfemoral membrane as far as the point perforated by the tail.

Length, head and body 2″·95, tail 0″·95, ear 0″·7, tragus 0″·23, forearm 2″·4, thumb 0″·35; third finger—metacarp. 2″·2, 1st ph. 0″·7, 2nd ph. 0″·9; fifth finger 2″, tibia 0″·9, foot 0″·45.

Hab. Egypt.

Type in the collection of the Paris Museum.

a, *b*, *c*. ad. sks. West Africa. Purchased.

5. Taphozous longimanus.

Taphozous longimanus, *Hardwicke, Linn. Transact.* xiv. p. 525 (1824); *Temm. Monogr. Mamm.* ii. p. 289; *Blyth, Journ. Asiat. Soc. Beng.* x. p. 974; *Kelaart, Prodr. Faunæ Zeylanicæ*, p. 12; *Wagner, Suppl. Schreb. Säugeth.* v. p. 688; *Horsfield, Catal. Mammal. Mus. E. I. Comp.* p. 41; *Dobson, Proc. Asiat. Soc. Beng.* Aug. 1872, p. 153; *P. Z. S.* 1875, p. 55; *id. Monogr. Asiat. Chiropt.* p. 170, figs. *a, b* (1876).

Taphozous fulvidus *et* brevicaudus, *Blyth, Journ. Asiat. Soc. Beng.* x. p. 975.

Taphozous cantori, *id.* xi. 784.

The gular sac is large and well-developed, though not so large as in *T. saccolæmus*; in the female it is represented by a rudimentary fold of skin and nakedness of the integument in the same situation *. Radio-metacarpal pouch moderately developed. Inner margin of ear smooth, not papillate; ears about same size as in *T. saccolæmus*.

Wings from the ankles.

The fur of the head extends upon the face slightly in front of the eyes; the muzzle is almost quite naked; the inner side of the ear-conch is rather thickly covered with moderately long fine hair; posteriorly the ear is almost naked, but a few fine hairs are ranged along the outer margin; the tragus is quite naked. On the upper surface the fur of the body extends upon the wing-membrane as far as a line joining the middle of the humerus and femur; posteriorly the interfemoral membrane is covered as far as the point of exit of the tail, along which some long fine hairs extend; the remainder of the interfemoral membrane is clothed with very short, almost invisible fur, which extends along the tibiæ to the feet, becoming longer on the terminal phalanges of the toes.

Beneath, the fur in front of the gular pouch, under the chin, is very short, and the skin there almost naked; the antebrachial membrane is covered with longer fur than upon the upper surface; on the wing-membrane the fur of the body extends more densely and further outwards than on the upper surface, being limited by a line joining the distal and middle thirds of the humerus and femur, but a narrow band of hairs extends outwards to the carpus; posteriorly the interfemoral membrane is naked, except at the root of the tail.

Fur varying from reddish brown to black, above and beneath, the bases of the hairs whitish.

Upper incisors small and very slender in some individuals, in the greater number of specimens absent.

Length, head and body 3″·1, tail 1″·15, head 0″·95, ear (anteriorly) 0″·8, tragus 0″·25, forearm 2″·45, thumb 0″·3, third finger 4″·2, fifth finger 2″·15, tibia 0″·95, calcaneum 0″·85, foot 0″·45.

Hab. Indian Peninsula; Ceylon; Burmah.

Abundant about Calcutta and in all the southern parts of the Indian Peninsula; not yet recorded from Northern India, nor from the Himalaya.

The colour of the fur varies very much. Among a large collection

* See figures in 'Monogr. Asiat. Chiropt.' referred to above.

of specimens taken at the same place, one may be found with reddish-brown fur, the others blacker. In all cases, however, the base of the fur is whitish, and the darker-coloured individuals are generally females. This species very closely resembles *T. perforatus*, Geoff., and may yet be shown to be a variety only of that species. The number of well-preserved specimens of the latter species in the Museums at present is not sufficient to decide the question.

a, b. ♂ ad., al.	India.	
c–f. ad. sks.	Calcutta.	
g, h. ♂ & ♀ ad., al.	Madras.	T. C. Jerdon, Esq. [P.].
i. ♂ ad., al.	Tenasserim Province.	Dr. Oldham [P.].
j. ad. sk.	Malacca.	A. Charlton, Esq. [P.].
k. skeleton.	India.	Dr. Leith [P.].
l. skeleton.		
m. skull.	Madras.	Sir Walter Elliot [P.].

Var. *a*.

Taphozous longimanus, *var.* leucopleurus.

A single specimen in the collection, obtained by Mr. Wallace in Flores, resembles *T. longimanus* from India and Burmah closely in general structure and in measurements, but differs slightly in the colour, quality, and distribution of the fur.

The fur is rather long, especially about the neck and upon the under surface of the wing-membrane between the humerus and femur. On the upper surface the posterior half of the antebrachial membrane is clothed with moderately long brown fur, and a small patch of very short hairs appears behind the elbow; the wings are clothed as far as a line drawn from the middle of the humerus to the distal third of the femur near the knee; very short, almost invisible hairs extend along the tibiæ to the feet, and a few long hairs spring from the base of the claws; beneath, the fur of the antebrachial membrane is longer, but occupies the anterior half of the membrane, and the wing-membrane is thickly clothed as far as a line drawn from the distal third of the humerus to the middle of the femur; a band of thinly spread fur (longer than in other species) passes outwards behind the forearm, increasing in width until, at the fifth metacarpal, it extends along almost half its length.

Above, pale greyish brown at the base of the hairs and for three fourths their length, the terminal third dark brown, tipped with paler greyish brown; beneath, similar, but the terminal third of the hairs is paler than on the upper surface, the long fur on the wings between the humerus and femur white.

Length, head and body 2″·9, tail 1″·1, ear 0″·8, thumb 0″·3, forearm 2″·3; third finger—metacarp. 2″·3, 1st ph. 0″·9, 2nd ph. 1″; fourth finger—metacarp. 1″·8, 1st ph. 0″·5, 2nd ph. 0″·3; fifth finger—metacarp. 1″·35, 1st ph. 0″·5, 2nd ph. 0″·4; tibia 0″·9, foot 0″·5.

Hab. Flores, Malay Archipelago.

a. ad. sk.	Flores.	A. R. Wallace, Esq. [C.].

6. Taphozous mauritianus.

Taphozous mauritianus, *Geoffroy, Descript. de l'Egypte*, ii. p. 127; *Temm. Monogr. Mammal.* ii. p. 291; *Wagner, Suppl. Schreb. Säugeth.* v. p. 685; *Dobson, P. Z. S.* 1875, p. 553.

Taphozous leucopterus, *Temm. l. c.* p. 284 (vide *Peters, MB. Akad. Berl.* 1869, p. 402); *Peters, Reise nach Mossambique, Säugeth.* p. 55, pl. xiii. fig. 20 (1852).

Inner margin of the ear indistinctly papillate; tragus naked, with a distinct angular projection near the base of its outer margin. Gular sac distinct in males, rudimentary in females, the throat being naked only in the position of the sac. Radio-metacarpal pouch smaller than in *T. longimanus*.

Wings from the ankles. Feet small.

On the upper surface the face in front of the eyes is covered with short hairs, and the fur of the back extends upon the interfemoral membrane slightly beyond the point of perforation by the tail; beneath, the distribution of fur upon the membrane is similar, but the interfemoral is very thinly covered.

Fur, above, from the base for three fourths its length light buff-brown, then dark brown with grey extremities; beneath, similar on shoulders and sides of the thorax and neck behind the ears as far back as the origin of the antehumeral membrane, the neck behind the gular pouch and the remainder of the chest and abdomen pure white.

On the upper surface the wing-membrane as far outwards as a line drawn from the ankle to the elbow and also the antehumeral and interfemoral membranes are brown; the remaining part of the wing-membrane white, except a small ill-defined patch of brown inside the first phalanx of the longest finger; beneath, all the membranes are white.

Length (of an adult ♂), head and body 3″·1, tail 1″, ear (anteriorly) 0″·8, tragus 0″·25, forearm 2″·4, thumb 0″·3; third finger—metacarp. 2″·25, 1st ph. 0″·9, 2nd ph. 1″; fifth finger—metacarp. 1″·35, 1st ph. 0″·5, 2nd ph. 0″·4; tibia 0″·85, foot 0″·45.

Hab. Ethiopian Region; Africa (eastern and western coasts), Madagascar, Bourbon and Mauritius islands.

The species is easily distinguished by the peculiar speckled appearance of the fur, which is quite different from that of any other known species of the genus, also by the white colour of the greater portion of the membranes.

a. ♀ ad., al.	West Africa.	Mr. Fraser [C.].
b. ♂ ad., al.	West Africa.	Purchased.
c. ad. sk.	West Africa.	Purchased.
d. ♀ ad. al.	Lagos.	Purchased.
e. ad. sk.	Cape of Good Hope.	Purchased.
f. ♀ ad., al.	Africa.	
g. ad. sk.	Africa.	
h, *i*. ad. sks.	Bourbon.	
j, *k*. ♂ & ♀ ad., al.		Purchased.

7. Taphozous nudiventris.

Taphozous nudiventris, *Cretzschmar, in Rüpp. Atlas Reise nördl. Afrika, Säugeth.* p. 70, fig. 27 *b* (1826); *Temminck, Monogr. Mammal.* ii. p. 280; *Wagner, Suppl. Schreb. Säugeth.* v. p. 684; *Dobson, P. Z. S.* 1875, p. 553; *Monogr. Asiat. Chiropt.* p. 171 (1876).

A small gular sac in males, rudimentary in females. Ear-conch papillate along inner margin. Radio-metacarpal pouch very small. Wings from the tibiæ above the ankles.

In front, the fur of the head does not extend upon the face beyond the frontal depression, and the muzzle is nearly naked; ear-conch with a few fine hairs only on its inner side; tragus naked. The fur of the back is limited laterally and posteriorly by a well-defined line, beyond which the finest hair does not pass; it does not extend upon the wing-membrane or upon the interfemoral; and the humerus, forearm, and antebrachial membrane are quite naked; posteriorly its termination is separated from the point of exit of the tail by a considerable interval, about three quarters of an inch. A few very long hairs, almost as long as in the species of *Molossus*, arise from the backs of the toes. Beneath, the throat is nearly naked; the wing-membrane is covered as far as a line drawn from the middle of the humerus towards the pubis, and a band of fine hairs extends outwards posterior to the forearm to the carpus; the lower part of the abdomen, the legs, and the interfemoral membrane are quite naked.

In this species large collections of fat surrounding the root of the tail and extending between the thighs are found in many specimens, especially in those taken during the hibernating season. This appears to be a provision for sustaining life during the cold season, and would seem to indicate that this is the most northerly species of the genus; for I have not observed similar deposits of fat in the body of any of the other species, which all inhabit tropical or subtropical regions. The only other species of Bat in which similarly large deposits of fat are found is *Rhinopoma microphyllum*, which inhabits the same countries.

Length (of an adult ♀), head and body 3″·7, tail 1″·6, ear 0″·85, tragus 0″·25, forearm 2″·95, thumb 0″·45; third finger—metacarp. 2″·55, 1st ph. 1″·1, 2nd ph. 1″·2; fifth finger 2″·8, tibia 1″·2, foot 0″·6.

Hab. Africa (North Africa, Egypt, Nubia, Gambia); Asia Minor (Palestine, Euphrates).

a. ♀ ad., al.	North Africa.	
b. ad. sk.	Gambia.	
c. ad. sk.	Africa.	
d. ♂ ad., al.	? Africa.	Purchased.
e–g. ♂ & ♀ ad., al.	Palestine.	Rev. H. B. Tristram [C.].
h–j. ad. sks.		Expedition to the Euphrates, 1850.
k. ♀ ad., al.		M. Parzudaki [C.].
l. ad. sk.		

Var. *a*.

Taphozous kachhensis, *Dobson, Journ. Asiat. Soc. Beng.* 1872, p. 221.
Taphozous nudiventris, subsp. kachhensis, *Dobson, P. Z. S.* 1875, p. 553; *Monogr. Asiat. Chiropt.* p. 172 (1876).

Very similar to *T. nudiventris* in general form and in the distribution of the fur, but distinguished by the absence of the gular sac in both male and female; in the male the usual position of the sac is indicated by a small semicircular fold of skin and nakedness of the integument; in the female the surface is smooth. The measurements are also slightly different; but the general resemblance to *T. nudiventris* is so close that I hesitate to class it as a distinct species.

Length (of an adult ♀), head and body 3″·6, tail 1″·25, ear 0″·9, tragus 0″·25, forearm 2″·95, thumb 0″·45; third finger—metacarp. 2″·7, 1st ph. 1″·1, 2nd ph. 1″·3; fifth finger 2″·7, tibia 1″·1, foot 0″·65.

Hab. Kachh, N.W. India.

Type in the collection of the Indian Museum, Calcutta.

II. *No radio-metacarpal pouch; lower lip divided in the centre of its upper surface and in front by a deep narrow groove.*
Subgenus 2. TAPHONYCTERIS.

8. Taphozous saccolæmus.

Taphozous saccolaimus, *Temminck, Monogr. Mammal.* ii. p. 285, pl. 60; *Dobson, P. Z. S.* 1875, p. 554; *Monogr. Asiat. Chiropt.* p. 172 (1876).
Taphozous crassus, *Blyth, Journ. As. Soc. Beng.* xiii. p. 491.
Taphozous pulcher, *Elliot, l. c.* p. 492.

Ears shorter than the head; tragus concave on outer surface, upper margin regularly convex, margined posteriorly by a fringe of fine hairs; inner margin of the ear-conch smooth, not papillate. Gular sac well developed in both male and female, but much larger in the male; lower lip with a deep narrow groove in the centre of its upper surface and in front. No radio-metacarpal pouch.

Wings from the ankles.

On the upper surface the fur of the body scarcely extends upon the wing-membrane, the line of attachment of which seems to limit its extent; posteriorly the fur terminates, as on the sides, in a well-defined line limited by the root of the tail; the interfemoral membrane and the legs are quite naked, the feet are also naked, thus differing from the greater number of, if not from all, the species of the genus. Beneath, the chin and sides of the gular sac are covered with very short hair, the thorax and abdomen with moderately long fur, as on the upper surface; the antebrachial membrane has a few fine hairs; and the wing-membrane is covered as far as a line joining the middle of the humerus and the femur, a line of fur passing outwards to the carpus and occupying a considerable triangular patch of membrane there between the forearm and fifth metacarpal bone.

Fur, above, white at the base, the greater part of the hairs dark

brown, the surface mottled with small irregular white patches; beneath, reddish brown.

Length, head and body 3″·5, tail 1″·3, ear 0″·8, tragus 0″·23, thumb 0″·5; third finger—metacarp. 2″·75, 1st ph. 1″·15, 2nd ph. 1″·2; fifth finger 2″·65, tibia 1″·2, foot 0″·65.

Hab. Lower Bengal (Sylhet); Ceylon; Burma; Malay Peninsula; Sumatra; Java.

Type in the collection of the Leyden Museum.

a, *b*. ad. sks.	India.	
c–*e*. ♂ ad., al.	Ceylon.	Dr. Thwaites [P.].
f. ♂ ad., al.	Singapore.	
g–*i*. ad. sks.	Java.	Purchased.
j. ♂ ad., al.		Purchased.
k. skeleton.		Purchased.

9. Taphozous affinis.

Taphozous affinis, *Dobson, Ann. & Mag. Nat. Hist.* 1875, xvi. p. 232; *P. Z. S.* 1875, p. 555; *Monogr. Asiat. Chiropt.* p. 173 (1876).

Ears shorter than the head; inner margin of the ear-conch not papillate; tragus rather short, almost quite circular above, outer surface concave. Lower lip with a deep narrow groove in the centre of its upper surface and in front (Plate XX. fig. 5). Male with a large gular sac, as large as in *T. saccolæmus*, rudimentary in the female, the margins of the sac alone developed. No radio-metacarpal pouch.

Wings from the ankles.

Distribution of the fur as in *T. saccolæmus*. Above black, the bases of the hairs white; beneath wholly pure silky white. The integument of the back is white; the antebrachial and interfemoral membranes, and that portion of the wing-membrane between the forearm and third finger, white, while that portion of the wing-membrane between the third and first fingers is black mottled with white along the third finger; beneath, the wing-membrane is pure white from the sides of the body outwards as far as the third finger, beyond which it is coloured as the corresponding part above.

This species is closely allied to *T. saccolæmus*, resembling it in its general structure and in measurements. It is at once distinguished by the pure whiteness of the fur of the thorax and abdomen and of the wing-membrane (the same in the four specimens preserved in spirit, from which the original description was made), which in *T. saccolæmus* is always some shade of brown. Structurally it is distinguished by the complete absence of a gular sac in the females; for in *T. saccolæmus* a sac exists in the females also, though much less developed than in the males. The margins of a gular sac are well defined in this species; but no cavity exists.

Length, head and body 3″·4, tail 1″·1, ear 0″·9, tragus 0″·25, forearm 2″·9, thumb 0″·5; third finger—metacarp. 2″·8, 1st ph. 1″·2, 2nd ph. 1″·2; fifth finger 2″·5, tibia 1″, foot 0″·6.

Hab. Labuan Island; Sumatra.

Mr. E. C. Buxton (in a note accompanying a specimen of this species) remarks:—"This Bat was killed at Telok Betony, in Sumatra, in the summer of 1876. There was an old hollow cocoa-nut stump in the garden, and about twenty of these Bats lived in it. At night, or rather early in the morning, they used to hang at the top of the verandah in company with several other kinds; and I found that they were all fruit-eaters, as there was a great deal of fruit refuse under them."

Although this does not prove that *T. affinis* occasionally feeds on fruits, as it is possible that the "other kinds" referred to may have been wholly the producers of the refuse found on the floor of the verandah, yet it appears probable that not only this species but also the other species of the genus may sometimes or habitually vary their insect food with fruit; for many of the American Bats, and especially the species of the closely allied genus *Noctilio*, with well-developed insectivorous dentition, are known to feed occasionally, if not for the greater part, on fruit.

a–c. ♂ & ♀ ad., al. (type).	Labuan.	Purchased.
d. ad. sk.	Sumatra.	E. C. Buxton, Esq. [P.].
e. ad. sk.		East India House [C.].

10. Taphozous peli.

Taphozous peli, *Temminck, Esquiss. zoolog. sur le côte de Guiné*, p. 82 (1853); *Dobson, P. Z. S.* 1875, p. 555.

Ears proportionally smaller and more triangular than in any of the other species, upper half of the inner margin of the ear-conch papillate; tragus rather short, evenly rounded above as in *T. saccolæmus*. Lower lip with a deep narrow groove (Plate XX. fig. 6, head). Gular sac very large in males, rudimentary (the margins only defined) in females. No radio-metacarpal pouch.

Fur of the body short, not extending to the membranes; distribution similar to that of *T. nudiventris*.

Above, dark reddish brown; beneath, a slightly paler shade of the same colour.

Length, head and body 4″·2, tail 1″·2, ear 1″, tragus 0″·3, forearm 3″·5, thumb 0″·6; third finger—metacarp. 3″·3, 1st ph. 1″·45, 2nd ph. 1″·45; fifth finger—metacarp. 2″·1, 1st ph. 0″·8, 2nd ph. 0″·45; tibia 1″·3, foot 0″·8.

Hab. Africa (Gold Coast, Cameroon Mountains, East Africa).

Type in the collection of the Leyden Museum.

This is by far the largest species of the genus.

a, *b*. ♂ & ♀ ad., al.	Cameroon Mountains.	Purchased.

Group DICLIDURI.

8. DICLIDURUS.

Diclidurus, *Wied, Isis*, 1819, p. 1629; *Beitr. Naturgesch. Brasil.* Bd. ii. p. 239 (1826).

Head and ears very similar to those of *Taphozous*, the forehead with a deep concavity; nostrils opening by wide horizontal valvular apertures; eyes remarkably large; sides of the muzzle not grooved, as in *Taphozous*; thumb very short, with a rudimentary claw, and almost wholly contained within the wing-membrane, as in *Furia*; the greater part of the tail inferior to the interfemoral membrane, and enclosed in a process derived from its inferior surface, its extremity contained in a pouch formed in the centre of the membrane, which it perforates.

Dentition. Inc. $\frac{1-1}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Upper incisors separated from the canines and also in front; the first upper premolar minute.

Range. Neotropical Region (Mexican and Brazilian Subregions).

1. Diclidurus albus.

Diclidurus albus, *Wied, Isis*, 1819, p. 1630; *Beitr. Naturgesch. Brasil.* Bd. ii. p. 242, pl. i. figs. *a–n* (skull and teeth) (1826).

Diclidurus freyreissii, *Wied, Abbild. zur Naturgesch. Brasil.* pl. xvi.; *Gray, Mag. Zool. & Bot.* ii. p. 502 (1838).

Ears much shorter than the head, rounded off above; outer margin of the ear-conch straight, not emarginate, terminating abruptly below the eye on a lower level than the angle of the mouth: tragus short and rather broad, maintaining the same breadth from the base of the inner margin upwards; superior margin straight, equal in length to the inner margin; outer margin straight, without lobule or emargination (Plate XX. fig. 7).

The very short terminal phalanx of the thumb ends in a subacute point, the termination of a rudimentary claw. At its terminal third the tail becomes included in the interfemoral membrane, which forms a pouch in the centre of its inferior surface; the extremity of the tail perforates the centre of this pouch, and the whole pouch is folded transversely upon itself, and by its posterior and upper surface upon the upper surface of the interfemoral membrane; the sides of this pouch are strengthened by a band passing upwards and outwards towards the knee (Plate XX. fig. 7*a*).

Wings from the ankles or tarsi; calcaneum nearly as long as the tibia; feet slender, toes equal in length; as if to compensate for the want of a claw on the thumb, the foot-claws are much curved and exceedingly sharp.

Fur, above and beneath, dark at the base, the greater part of the hairs to the tip yellowish or creamy white; integumentary system white throughout.

Upper incisors slender, very acutely pointed, with a second external and much shorter cusp, the tooth on each side directed forwards and inwards; lower incisors trifid, placed across the direction of the jaws, the two central incisors separated by a slight interval. First upper premolar minute, acutely pointed, in the centre of the rather wide space between the canine and second premolar; first lower premolar about three fourths the size of the second premolar.

(For measurements see below.)

Hab. Central and South America.

According to the Prince of Neuwied, the type of this species was found between the large leaves of the Cocoanut Palm (*Cocos nucifera*) near the estuary of the Rio Pardo in Brazil.

a. ad. sk.	South America.	Sir E. Belcher [C.].
b. ♀ ad., al.		M. Lidth de Jeude [C.].

2. Diclidurus scutatus.

Diclidurus scutatus, *Peters, MB. Akad. Berl.* 1869, p. 400.

When examining the collection in the Paris Museum, I unfortunately overlooked the type of this species, which is described by Dr. Peters as much smaller, but with a longer tibia and calcaneum, and with a quite differently formed pouch in the interfemoral membrane. The colour of the fur is similar, and, with the above-named exceptions, the measurements exhibit the same proportion. The species must therefore be very closely allied.

The following are the measurements of this species and of *D. albus* respectively :—

	D. scutatus.	*D. albus.*
Length, head and body	2·2	2·5
,, tail	0·8	0·9
,, head	...	0·8
,, ear	...	0·7
,, tragus	...	0·22
,, forearm	2·0	2·4
,, thumb	0·2	0·22
,, third finger, metacarpal	1·95	2·3
,, ,, ,, 1st phalanx	0·35	0·4
,, ,, ,, 2nd ,,	0·93	1·1
,, fourth finger, metacarpal	1·5	1·8
,, ,, ,, 1st phalanx	0·4	0·55
,, ,, ,, 2nd ,,	0·35	0·4
,, fifth finger, metacarpal	1·2	1·4
,, ,, ,, 1st phalanx	0·6	0·7
,, ,, ,, 2nd ,,	0·23	0·3
,, tibia	0·9	0·75
,, calcaneum	0·8	0·65
,, foot	0·35	0·4

Hab. South America. Type in the Paris Museum.

Group NOCTILIONES.

9. NOCTILIO.

Noctilio, *Linnæus, Syst. Nat.* (ed. xii.) p. 88 (1776); *Geoffroy, Descript. de l'Egypte*, ii. p. 114 (1812); *Spix, Simiar. et Vespert. Bresil.* p. 57 (1823); *Gray, Mag. Zool. & Bot.* ii. p. 499 (1838); *Burmeister, Thiere Brasiliens*, p. 58 (1854).
Celæno, *Leach, Trans. Linn. Soc.* xiii. p. 70 (1822).

Ears arising separately from the sides of the head, the outer margin terminating in a distinct antitragus in front of the base of the tragus; tragus longer than broad, with prominent tooth-like processes; apertures of the nostrils oval, close together, the extremity of the nose projecting beyond the lower lip; chin with raised cutaneous ridges; third finger very long, the first phalanx extended (in repose) in a line with the metacarpal bone; general form of the wing very similar to that of *Emballonura*; interfemoral membrane large, extended in the expanded condition far beyond the short tail, which perforates its basal third and appears upon its upper surface; in the perinæum (in the two species known), corresponding to the position of the testicles, a large follicular glandular organ, with a corrugated lining membrane, is placed on either side of the base of the penis (vide *infrà*, p. 396); females with a remarkably long clitoris, but without glandular follicles.

Dentition. Inc. $\frac{4}{2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

Upper inner incisors unicuspidate, moderately long, in the centre of the space between the canines; outer incisor on each side very small and in a plane posterior to the inner incisor; premolars and molars with very acute cusps, the W-shaped cusps of the upper molars projecting externally far beyond the lower molars when the jaws are closed; frontal bones small, flattened, no postorbital processes; nasal aperture small, directed forwards; premaxillary bones slender, united in the centre; skull rather short and broad, with prominent mastoid and paroccipital processes; auditory *bullæ osseæ* large, separated by a narrow and short basioccipital.

Range. The tropical parts of the Neotropical Region.

This genus, as I have previously remarked (Ann. & Mag. Nat. Hist. 1875, xvi. p. 352), connects the subfamily *Emballonurinæ* with the *Phyllostomidæ* through the *Lobostominæ*. Its affinities with *Chilonycteris*, and the genera allied thereto, are shown by the presence of a small incisor on each side external to the large central upper incisors, by the development of the mastoid and paroccipital processes, by the short first phalanx of the middle finger, which is not flexed upwards (in repose) on the dorsal surface of the metacarpal bone (as in other species of *Emballonuridæ*), and by the erect cutaneous ridges on the chin, and especially by the form of the nostrils and ears and by the microscopical characters of the fur.

In habits also the species resemble those of the *Phyllostomidæ*. Their food appears to be of a mixed character, probably chiefly con-

sisting of insects (the Prince of Neuwied found insect-remains in the stomach of *N. dorsatus**; and individuals of the same variety obtained by Mr. Gosse in Jamaica fed eagerly on cockroaches†), but occasionally of other small animals, as minute Crustacea‡; also of some fruits (Linnæus, in his original description of *N. leporinus*, remarks, "*victitans fructibus arborum*"); and in the intestines of specimens of the same species received by me from British Guiana I found the seeds of some fruit, perhaps of *Morus tinctoria*. Tschudi ('Fauna Peruana,' p. 77) remarks:—"They (*Noctilio unicolor* et *affinis*) live in hollow trees, and feed on beetles, which we always found in their stomachs."

Synopsis of the Species.

a. Larger; forearm in adults at least 3 inches long; foot 1″; upper molars touching by the extremities only of their external cusps, with narrow spaces between the adjacent teeth.. 1. *N. leporinus*, p. 394.

b. Smaller; forearm in adults not exceeding 2″·5 in length; foot 0″·6; upper molars closely approximated together without intervening spaces ..... 2. *N. albiventer*, p. 398.

1. Noctilio leporinus.

Vespertilio leporinus, *Linnæus, Syst. Nat.* (ed. x.) p. 32; *Schreber, Säugethiere*, p. 162, pl. lx. (1775).
Noctilio americanus, *Linnæus, Syst. Nat.* (ed. xii.) p. 88 (1776).
Celæno brooksiana, *Leach, Trans. Linn. Soc.* xiii. p. 70 (1822).
Noctilio rufus, *Spix, Simiar. et Vespert. Bresil.* p. 57, pl. xxv. fig. 1 (1823) (vide *Peters, MB. Akad. Berl.* 1865, p. 570).
Noctilio unicolor, *Geoffroy, Wied, Beitr. Naturg. Brasil.* p. 223 (1826); *Tschudi, Fauna Peruana*, p. 76 (1844–46); *Blainville, Ostéographie*, pl. 8 (skull).
Noctilio leporinus, *D'Orbigny et Gervais, Voyage dans l'Amérique Mérid., Mammif.* p. 12, pl. 9. figs. 1–4; *Peters, l. c.* pl. figs. 1–1 *b* (skull).

(For additional synonymy see p. 396.)

Ears about one fifth shorter than the head, very narrow and pointed; ear-conch attenuated in upper fourth, both the inner and outer margins concave above, the latter more so, and the very narrowly rounded-off tip inclines slightly outwards; lower three fourths of the inner margin evenly convex, the base arising abruptly from the side of the head; corresponding portion of the outer margin faintly convex or straight, abruptly emarginate opposite the tragus, beyond which it is reflected outwards, forming a well-defined rounded antitragus, from the base of which in front a raised ridge extends forwards along the side of the face to the angle of the mouth; tragus much longer than broad, inclined outwards, the outer and superior margins with five prominent projections like the teeth of a comb. Crown of the head slightly elevated. Muzzle conical, the prominent

* Beitr. zur Naturg. Brasil. Bd. ii. p. 223.
† *Vide* p. 396, *infrà*. ‡ *Vide* p. 397, *infrà*.

extremity of the nose projecting beyond the lower lip; nostrils close together; nasal apertures oval, directed forwards and slightly outwards, terminating the muzzle, the projecting nose overhanging the upper lip, which has a prominent elevation in the centre beneath directly in front of the upper incisor teeth; sides of the upper lip pendulous, with a convex margin; lower lip folded outwards on the sides to allow room for the very long upper canines, at the angles of the mouth enclosing the upper lip; centre of the lower lip forming a naked prominence in front of the lower incisors; chin and under surface of the lower jaw with several prominent ridges, whereof the most anterior is a small triangular, anteriorly concave, lappet, from the back of which two small erect ridges extend backwards and outwards; more posteriorly a slightly raised cutaneous ridge, corresponding to the position of the rami of the lower jaw, includes a prominent wart in front, and forms externally the internal boundary of a space occupied by corrugated skin (see Plate XXI. fig. 9, head of *N. albiventer*).

Thumb rather short, with a very acutely pointed claw; wings from the distal third of the tibia and from the sides of the back close to the spine; interfemoral membrane very large, extending far beyond the short tail when expanded in flight, but in repose folded up very completely beneath it; feet remarkably large and strong, armed with extremely acute and much curved claws.

Fur bright reddish yellow above and beneath, the fur of the under surface slightly paler in colour. On both surfaces the hair is short and does not extend to the membranes, on the back across the loins it scarcely occupies a space three quarters of an inch in width.

Central upper incisors touching by their inner sides, but separated at their bases and at their extremities; outer incisor on each side very small, scarcely raised above the gum, its summit hardly as high as the cingulum of the inner incisor, close to the posterior and external sides of which it is placed, being separated from the canine by a wide space; upper canines remarkably long, pushing the lower lip downwards before them, their outer margins are convex, their inner concave; the single upper premolar close to the canine; molars touching by their adjacent external cusps, but separated by narrow spaces at their bases; last molar equal to half the antepenultimate molar; lower incisors small, bifid, filling up the narrow space between the canines; the two lower premolars are placed obliquely across the jaw, and crushed in between the canine and the first molar; the first is about the size of one of the lower incisors, is placed in the inner angle between the canine and the second premolar, and is not visible from without; the second is nearly equal to half the first molar, and its long diameter is directed inwards and backwards; the three molars then follow in regular succession, placed at right angles to the direction of the mandible, their very acute cusps received into the spaces between the upper molars and between their cusps, so that in the closed condition of the jaws the lower tooth-row is almost completely hidden.

(For measurements see Table, p. 399.)

Hab. Brazilian Subregion and Peru.

This species varies considerably in size according to locality, and in a less degree in the colour of the fur.

a. ♂ ad., al.	Demerara.	Purchased.
b. ♂ ad., al.	British Guiana.	Purchased.
c. ♂ ad., al.	Coast of South America.	Capt. Sir E. Belcher [C.].
d, *e*. ♂ ad., al.	No history.	
f. ♂ ad., al.		M. Lidth de Jeude.
g. ♂ ad., al.		Mr. Brandt [C.].

Var. *a*.

Vespertilio mastivus, *Dahl, Skrifter af Naturhistorie-Selskabet Kjöbenhavn*, 1797, iv. 1, p. 132, pl. 7 (vide *Peters, l. c.*).

Noctilio dorsatus, *Wied, l. c.* p. 218; *Blainville, Ostéographie*, pl. iv. (skeleton), pl. xiv. (teeth).

Noctilio mastivus, *Gosse, P. Z. S.* June 1847; *Ann. & Mag. Nat. Hist.* xx. p. 424 (1847).

Noctilio leporinus, *Burmeister, Thiere Brasiliens*, p. 60 (1854).

About the size of *N. leporinus*, or probably larger; distinguished by a well-defined narrow line of fur of a pale yellow colour extending along the spine from the head to the tail; the fur of the under surface appears also to be of a paler colour than in *N. leporinus*.

The following notes by Mr. Gosse were derived from an examination of the living animal:—"Colour varying; upper parts yellow-brown, more or less bright; a well-defined narrow line of pale fulvous runs medially down the back from the head to the tail; under parts pale fawn, bright fulvous or orange; face purplish; the muzzle and chin are much corrugated; face warty; the ears fall into elegant curves. The volar membranes are delicately thin, transparent, and glossy; studded with minute, white, papillary glands, which for the most part follow the course of the blood-vessels, but are largest and most numerous in the vicinity of the trunk. The membranes being attached along each side of the spine, with an interval in the middle of the back of but seven tenths of an inch, the body is, to a great extent, free. The wing, when at rest, has but a single fold, the ultimate joint of the second and third fingers being brought back upon the penultimate. The reproductive organs are large and prominent. At the base of the penis are two follicles, secreting a dark brown substance, dry and lumpy, but friable between the fingers, most insufferably musky, the odour from which is strongly diffused by the animal during life"*.

(For measurements see Table, p. 399.)

Hab. Antillean and Brazilian Subregions.

The habits of this variety were studied by Mr. Gosse during his sojourn in Jamaica. Of some specimens obtained alive from the interior of a hollow cotton-tree, he remarks (*l. c.* p. 426):—"I presented to one a large cockroach, which he seized greedily and

* P. Z. S. June 1847.

munched up, moving the jaws only vertically. The eating was attended with a loud and very harsh cranching of the teeth, not produced by crushing the horny parts of the insect, for it was equally perceptible when munching a bit of soft flesh. The jaws moved rapidly, but yet the mastication was a long operation, for it appeared to me to be performed almost wholly by the canines. As the insect was progressively masticated, portions were allowed to fall into the cheek-pouches (the one being pretty well filled before the other was used), which when full hung down on each side of the lower jaw to the depth of three or four lines, like distended bags, displaying a warted surface. When the whole of one cockroach had been masticated, and deposited in the pouches, it would take another, which was gradually disposed of in the same receptacles; then, after a few moments intermission, by a contortion of the jaw, aided by the motion of the muscles of the pouch, a portion was returned to the mouth, and again masticated. This was repeated till all was swallowed, and the pouches appeared empty and contracted up out of sight. Small portions of the muscle of a bird, which were presented to one, he chewed up and deposited in the pouches; but after being regurgitated, and a second time masticated, they were expelled instead of being swallowed. The process of eating seemed an awkward one; it was a rapid succession of choppings with the long canines, through which the tongue was thrust about so nimbly that it appeared a wonder it was not impaled perpetually.

"In order to rest like other Bats, they crawled upwards and backwards by means of the hind feet, seeking the greatest elevation they could attain which afforded a hold for the claws. They were social, though both were males; usually hanging side by side, or sometimes with the leg of one crossing the leg of the other, or even one upon the other. Sometimes they brought their faces together, and licked each other's open mouths in a singular manner; and this appeared grateful to them."

The following note accompanied some specimens obtained by Mr. Fraser in Ecuador:—"Esmeraldas, Nov. 1859. Skimming the bank of the river, every now and then making a dash along, and actually striking the water, catching the minute shrimps as they pass up stream. He had a very offensive fishy smell."

a–c. ad. sks.	Jamaica.	P. H. Gosse, Esq. [C.].
d. ♂ ad., al.	Mount Edgecombe, Jamaica.	P. H. Gosse, Esq. [C.].
e. ♀ ad., al.	Island of St. Thomas.	Capt. Sawyer [P.].
f. ♂ ad., al.	Island of Grenada.	Purchased.
g. ♀ ad., al.		Zool. Soc. Coll.
h. ♀ ad., al.	Province of Tachira, Venezuela.	Purchased.
i. ♂ ad., al.		M. Lidth de Jeude.
j, k. ad. sks.	Interior of Brazil.	Old Collection.
l. ad. sk.	? Brazil.	J. Rocke, Esq. [P.].
m. ad. sk.		Haslar Hospital.
n. skull of *c.*		
o–q. skulls.		Zool. Soc. Coll.
r. skeleton.	Ecuador.	Mr. Bollaert [C.].

2. Noctilio albiventer.

Noctilio albiventer, *Spix, Simiar. et Vespert. Brasil.* p. 58, figs. 2 & 3 (1823); *Peters, MB. Akad. Berl.* 1865, p. 570, pl. figs. 2, 2 *a*.
Noctilio affinis, *D'Orbigny et Gervais, l. c.* p. 11, pl. 10. fig. 1.
Noctilio leporinus, *Gervais, Expédition du Comte de Castelnau, Zoologie*, pl. 12. fig. 6 *b* (skull) (vide *Peters, l. c.*).

Much smaller than *N. leporinus*, and with a comparatively much shorter foot, the muzzle is also comparatively shorter, the fur slightly different in colour, and, as pointed out by Dr. Peters, the skull shows important differences by which this species can be alone distinguished. In other respects, in the form of the ear-conch and tragus, in the very peculiarly shaped extremity of the muzzle, in the cutaneous ridges on the chin and beneath the lower jaw (Plate XX. fig. 9), and in the number and general shape of the teeth, this species resembles *N. leporinus* very closely, so closely that on a superficial examination it would, most probably, be confounded with not fully grown specimens of that species. Indeed, externally, the only character by which this species may be at once distinguished is found in the conspicuously shorter foot, which is scarcely more than half the length of that in *N. leporinus*, although the forearm in adult specimens is not more than an inch shorter than in that species.

Fur bright reddish yellow above, with or without a spinal line as in *N. leporinus*; beneath, pale yellowish white, slightly darker on the sides.

Incisors, canines, and premolars as in *N. leporinus*, but the upper molars are close together by their bases, and the antero-internal cusps of the lower molars are consequently much less developed in a vertical direction than in that species, where space exists between the bases of the upper molars to receive them when the jaws are closed.

The skull differs greatly from that of *N. leporinus* in the remarkable development of the sagittal crest and of the mastoid and paroccipital processes. The sagittal crest in the centre is nearly one tenth of an inch in height, and at its union behind with the superior angle of the occipital crest forms a large protuberance, which projects backwards and overhangs the concave supraoccipital. In *N. leporinus* the sagittal crest is well developed, but not quarter the height of that in this species, and the occipital protuberance is small, and does not overhang the supraoccipital.

(For measurements see Table, p. 399.)

The above description is taken from an adult male, preserved in alcohol, which, in measurements and in general characters, agrees with the type of *N. albiventer*, Spix, as described by Peters. The fur is, however, unicoloured above, without dorsal white stripe, and the infraorbital foramen is placed in the same relative position as in *N. leporinus*, or even slightly higher up, not level with the zygomatic arch as in the type of *N. albiventer*. This, therefore, may be an example of the variety described as *N. ruber* by Rengger (Säugeth. Paraguay, p. 95), which agrees in size with Spix's type,

but differs in the absence of the dorsal stripe, and is therefore, as Dr. Peters remarks, to *N. albiventer* as *N. unicolor* to *N. dorsatus*.

a, b. ♀ imm. sks. Bolivia. Mr. Bridges [C.].
(With very distinct dorsal streak.)
c. ♂ ad., sk. (without dorsal streak). M. Lidth de Jeude.
d, e. skulls of *a, b* (with sagittal crest not more developed than in *N. leporinus*).
f. skull of *c* (with greatly developed sagittal crest described above).

The following Table exhibits:—in the first column the measurements of an adult male specimen of *N. leporinus* from Venezuela, with distinct dorsal streak; in the second, those of a smaller but adult male of the same species, without dorsal streak, from Demerara; in the third, those of an adult male of *N. albiventer* without dorsal streak, from the collection of M. Lidth de Jeude.

	Noctilio leporinus.		*N. albiventer.*
Length, head and body, about ..	4·0	3·25	2·7
,, tail	1·1	1·2	0·9
,, head	1·25	1·2	1·0
,, ear	1·0	0·95	0·85
,, tragus	0·25	0·25	0·25
,, forearm	3·5	3·25	2·5
,, thumb	0·48	0·45	0·4
,, third finger, metacarpal	3·0	2·8	2·15
,, ,, 1st phalanx	0·9	0·85	0·53
,, ,, 2nd ,,	2·9	2·7	2·1
,, fourth finger, metacarpal	3·1	2·9	2·2
,, ,, 1st phalanx	0·55	0·55	0·33
,, ,, 2nd ,,	1·5	1·45	2·05
,, fifth finger, metacarpal	2·95	2·75	2·15
,, ,, 1st phalanx	0·7	0·7	0·43
,, ,, 2nd ,,	0·4	0·3	0·15
,, tibia	...	1·45	0·9
,, calcaneum	...	1·6	1·4
,, foot	...	1·1	0·6

Group RHINOPOMATA.

10. RHINOPOMA.

Rhinopoma, *Geoffroy, Descript. de l'Egypte*, ii. p. 123 (1812); *Gray, P. Z. S.* 1866, p. 82; *Dobson, Monogr. Asiat. Chiropt.* p. 174 (1876).

Crown of the head slightly elevated above the face-line; muzzle thick, obtuse, the superior extremity projecting; nostrils valvular, in the front surface of a fleshy prominence at the anterior extremity of the muzzle; ears united across the forehead, which is deeply concave between the eyes, as in *Taphozous*; tragus distinct; *index finger with two phalanges*; tail slender, produced considerably beyond the truncated interfemoral membrane.

Dentition. Inc. $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

Upper incisors rudimentary, suspended from the small premaxillary bones, which are united in the centre, and connected laterally by

slender processes, as in *Emballonura*, with the maxillary bones. Nasal bones much expanded laterally and vertically, while, posteriorly, the frontal bones are depressed, forming a shallow concavity in the forehead.

Range. From Egypt through Asia Minor to India and Burma.

Dr. Peters remarks that this genus, through the presence of two phalanges in the index-finger, the development of the feet, and the form of the intermaxillary bones, comes most closely, of all genera of Insectivorous Bats, to the Pteropine Bats.

1. Rhinopoma microphyllum.

Rhinopoma microphyllus, *Geoffroy, Descript. de l'Egypte*, ii. p. 123.
Rhinopoma microphyllum, *Wagner, Suppl. Schreb. Säugeth.* i. p. 444 (1844); *Dobson, Monogr. Asiat. Chiropt.* p. 174 (1876).
Rhinopoma hardwickii, *Gray, Zoolog. Miscell.* p. 37 (1831); *Blyth, Journ. Asiat. Soc. Beng.* xiii. p. 492; *Catal. Mamm. of Burma*, p. 18 (1875); *Dobson, Journ. Asiat. Soc. Beng.* 1872, p. 211, figs. *a–c.*
Vespertilio (Rhinopoma) hardwickii, *Elliot, Catal. Mammals South Mahratta Country*, p. 6, Madras (1840).
? Rhinopoma lepsianum, *Peters, MB. Akad. Berl.* 1859, p. 222.

Extremity of the muzzle thick, obtuse, obliquely truncated, projecting considerably beyond the lower lip; nasal apertures consisting of transverse valvular slits; nose-leaf very small, upper margin convex, with a small raphe passing downwards between the nostrils; forehead with a deep circular concavity between the eyes, from which a narrow groove passes forwards along the centre of the muzzle to the base of the nose-leaf. Ears shorter than the head; laid forwards the tips do not reach as far as the posterior margin of the nose-leaf; inner and outer margins slightly convex, the outer margin straight for a short distance immediately beneath the tip, extremity rounded off; the lower third of the inner margin of the conch connected by a deep band arising immediately behind the frontal depression; outer margin ending between the base of the tragus and the angle of the mouth, not forming a separate lobule near its termination: tragus longer than wide, reaching its greatest width about the middle of the inner margin; extremity obtuse, indistinctly and irregularly toothed, inner margin straight or slightly concave, outer margin convex; at the base a triangular lobule.

First phalanx of the middle finger imperfectly flexed backwards (in repose) upon the dorsal surface of the metacarpal bone.

Tibia very long and straight, fibula very slender; feet long and slender, the first toe equal to the middle toe in length, as in *Taphozous*; wing-membrane from the lower third of the tibia; calcaneum feeble; interfemoral membrane very short, perforated close to its concave free margin by the long slender tail, which is produced beyond it to a distance equal to the length of the forearm.

The face is almost quite naked; the margin of the upper lip is fringed with a few fine hairs, which are most dense on the truncated extremity of the muzzle, margining the upper edge of a triangular slightly concave space intervening between the margin of the upper

lip and the end of the muzzle above. On the back the fur is very short, and strictly limited to it, not extending upon the wing- or interfemoral membrane, and leaving a considerable portion of the posterior part of the back naked. The skin of this part and of the wings near the body is covered with transverse and longitudinal wrinkles, as in *Taphozous nudiventris* and in *Cheiromeles torquatus*. The distribution of the fur beneath is somewhat similar; but a few fine hairs appear upon the wing-membrane near the body and upon the wings and forearm; the remainder of the wings is quite naked. The extremity of the tail has a few long hairs, as in *Taphozous*, and also the backs of the terminal phalanges of the feet.

The nasal bones are much expanded laterally, forming round prominent projections above the infraorbital foramen on each side; immediately behind the frontal is slightly concave; there are no postorbital processes; zygomatic arches extremely slender; bony palate very short, scarcely extending in the middle line as far back as the last molar; roof of the mesopterygoid fossa continuous with the basisphenoid and the basioccipital.

Premaxillary bones very slender, forming a commissure in the middle line, each bone supporting on its outer side an extremely slender incisor, which is directed outwards and downwards towards the canine of the same side. The single upper premolar exceeds the molars in vertical extent, with a second vertical basal cusp on its outer and anterior side; last upper molar less than half the antepenultimate molar.

The Asiatic representatives of this species differ from the African in their shorter fur, which does not anywhere extend upon the membranes, and in their much shorter tail and longer thumb. In all other respects they agree so closely together that I am unable to consider them distinct species. In the following Table the measurements of two perfectly adult specimens, one from Africa (the type of the species, preserved in the Paris Museum), the other from Kachh, in India, are compared:—

	Egypt.	India.
Length, head and body	3·0	3·0
„ tail	2·6	2·35
„ „ free from membrane	2·25	1·65
„ head	1·0	1·0
„ ear	0·85	0·85
„ forearm	2·7	2·6
„ thumb	0·4	0·5
„ third finger, metacarpal	1·9	1·8
„ „ „ 1st phalanx	0·4	0·45
„ „ „ 2nd „	0·8	0·8
„ fourth finger, metacarpal	1·45	1·45
„ „ „ 1st phalanx	0·45	0·6
„ „ „ 2nd „	0·4	0·45
„ fifth finger, metacarpal	1·6	1·7
„ „ „ 1st phalanx	0·45	0·45
„ „ „ 2nd „	0·4	0·4
„ tibia	1·1	1·05
„ foot	0·6	0·6

Specimens brought by the late Dr. Stoliczka from Kachh (N.W. India) and now in the collection of the Indian Museum, Calcutta, have large deposits of fat about the base of the tail, as in *Taphozous nudiventris* (which inhabits the same countries). They were obtained during the winter, and it is probable that the fat in this position is laid up on the approach of the hibernating season.

Hab. Africa (Egypt, Kordofan); Asia Minor (Palestine); Indian Peninsula generally; Burma.

a–d. ad. sks.	Egypt.	
e. ♂ ad., al.	Egypt.	G. E. Dobson, M.B. [E.].
f. ad. sk.	Arashkool.	Purchased.
g, h. ad. sks.	Kordofan.	Purchased.
i–l. ♂ & ♀ ad., al.	Mt. Quarantaria, Palestine.	Rev. H. B. Tristram [C.].
m. ♂ ad., al.	India. (Type of *Rhinopoma hardwickii*.)	General Hardwicke [P.].
n. ♀ ad., al.	India.	General Hardwicke [P.].
o. ♂ ad., al.	India.	
p. ♀ ad., al.	India.	
q, r. ♂ ad., al.	Allahabad, India.	Secretary of State for India [P.].
s–u. ad. sks.	Nusserabad.	
v. ad. sk.	Nusserabad.	Purchased.
w. ad. sk.	Madras.	Sir Walter Elliot [P.].
x. ad. sk.	Calcutta.	
y, z. ♂ im. & ♂ ad., al.		M. Parzudaki [C.].
a'. ad. sk.		Capt. Fitzroy [C.].
b'–d'. ad. sks.		
e'–g'. skulls.	Kashmir.	Prof. Oldham [P.].
h'. skull.	Madras.	Sir Walter Elliot [P.].
i'. skull.	India.	Sir Walter Elliot [P.].

Subfam. II. MOLOSSINÆ.

Tail thick, produced far beyond the posterior margin of the interfemoral membrane *, which is movable upon it; antebrachial membrane very small; legs short and strong, with well-developed fibulæ; feet large, the first toe (and often the fifth also) much larger than the others; upper incisors strong.

This Subfamily includes all the species of Emballonuridæ with short and strong legs and broad feet—whereof the first toe (and in most species the fifth also) is much thicker than the others and furnished with long curved hairs,—with well-developed callosities at the base of the thumbs, and with a single pair of large upper incisors occupying the centre of the space between the canines.

The feet in all the species are free from the wing-membrane, which folds up very perfectly under the forearm and legs; and the narrow and, in some cases, rudimentary antebrachial membrane does not extend beyond the proximal half of the forearm; the inter-

* Except in *Mystacina*.

femoral membrane is retractile, being movable backwards and forwards along the tail, or (in *Mystacina* only, see p. 443) can be very completely folded up upon itself and hidden away like the wings.

The strength of the anterior and posterior limbs, the development of the callosities at the base of the thumbs, the large flat feet with thickened outer and inner toes, the freedom of the forearms, thumbs, and feet from the volar membranes, which are very perfectly folded away (in repose), indicate collectively that the species of this Subfamily are, of all Bats, most fitted for terrestrial progression; and this induction is confirmed by those who have observed their habits. (See notes on the habits of *Molossus obscurus*, *M. glaucinus*, and *Nyctinomus brasiliensis*.)

Group MOLOSSI.

Ears large and broad, generally united; tragus small; muzzle broad, obtuse, obliquely truncated; nostrils opening by circular apertures, their projecting margins terminating the muzzle in front; first phalanx of the middle finger folded (in repose) on the back of the metacarpal bone; legs very short and strong; feet broad, the outer and inner toes much thickened and larger than the others, and furnished with long curved prehensile hairs; tail thick, produced far beyond the posterior margin of the interfemoral membrane; brain-case thick, flat, and broad.

In all the species the upper lip is very thick, and often deeply furrowed by vertical wrinkles, evidence of its great expansibility. The wings are very narrow, and the middle finger very long, its metacarpal bone in most species slightly exceeding the total length of the last finger. The first phalanx of the middle finger is short, less than half the length of the metacarpal bone, on the dorsal surface of which it is folded forwards in repose. The interfemoral membrane sheaths the base of the tail, and is movable at the will of the animal backwards or forwards upon it, thus increasing or diminishing its surface.

The great length and narrowness of the wings indicate rapid flight; and the power possessed by these Bats of varying the extent of surface of the interfemoral membrane must confer upon them great dexterity in quickly changing the direction of their flight, as when obliged to double in pursuing their swiftly flying insect prey; while the extremely expansible lips evidently aid them especially in capturing during rapid flight, and in maintaining their hold on, the large round-bodied Coleoptera. Of all Bats the *Molossi* appear especially suited by their peculiar conformation for capturing the most rapidly flying insects, which, no doubt, form the greater portion of their food. Their large and very strong acutely tubercular teeth would enable them to crush with ease the hard armour of the larger Coleoptera.

(For remarks on habits &c., see notes under descriptions of species.)

Range. The tropical, subtropical, and warmer parts of the temperate regions of both hemispheres.

Synopsis of the Genera of Molossi.

a. First toe much larger and thicker than the other toes and separable from them; ears quite separate.
  a'. Premaxillary bones united; upper incisors very strong, close together in front — 11. CHEIROMELES, p. 405.
b. First and fifth toes much thicker than the other toes; ears united or close together by their inner margins.
  b'. Premaxillary bones united; upper incisors close together in front ..... — 12. MOLOSSUS, p. 407.
  c'. Premaxillary bones separate, or united by cartilage only; upper incisors separate in front ..... — 13. NYCTINOMUS, p. 420.

The genus *Cheiromeles* is represented by a single species only, which, as I have previously remarked*, appears to be more closely allied to *Molossus*, which is restricted to America, than to *Nyctinomus*, of which several species inhabit the same countries with it.

The genera *Molossus* and *Nyctinomus* are very closely allied, some species, as *Molossus glaucinus*, Wagner, and *M. bonariensis*, Peters, forming the connecting links between them. Nevertheless I retain these genera distinct, as they are convenient for grouping the species, and partly correspond to their geographical distribution, the species of *Molossus* being limited to America, while those of *Nyctinomus* are found in both hemispheres.

These genera have been divided into several subgenera, which depend on slight differences in dentition and in the form of the ear-conch and tragus. But so many perfectly intermediate forms exist that it is impossible to subdivide *Molossus* and *Nyctinomus*, which, indeed, as I have remarked above, may come to be regarded hereafter as subgenera only. Thus *M.* (*Promops*) *abrasus* resembles *M. rufus* (the representative of the subgenus *Molossus*) closely in the form of the tragus and in the obtuse not obliquely truncated muzzle; and *M.* (*Promops*) *nasutus*, relegated to the subgenus *Promops* on account of its dentition, in all other respects is much more closely allied to *M. rufus*, with which it agrees in the peculiar form of the antitragus and tragus, and even in the distribution of the fur; while *M. rufus*, which differs from every other species in dentition, shows its close affinity to the representatives of the subgenus *Myopterus* in the perfectly similar form of its antitragus and in the shape of its muzzle.

The subgenus *Mormopterus* is distinguished from *Nyctinomus* by the absence of the first minute upper incisor, and by the distinctly separate ears; but *N. norfolcensis*, Gray, is quite intermediate, agreeing with *Nyctinomus* in dentition, and in other respects with *Mor-*

* 'Monograph of the Asiatic Chiroptera,' p. 177.

mopterus; and the discovery of *N. albiventer*, Dobson (described further on), adds another intermediate form *.

11. CHEIROMELES.

Cheiromeles, *Horsfield, Zool. Researches in Java* (1824); *Temminck, Monogr. Mammal.* ii. p. 345; *Dobson, Monogr. Asiat. Chiropt.* 1876, p. 177; *id. P. Z. S.* 1876, p. 704.

Ears separate, as in *Taphozous*; extremity of the muzzle projecting considerably beyond the lower jaw; lips smooth, not grooved by vertical wrinkles; first toe much larger than the others, and separable from them.

Dentition. Inc. $\frac{2}{2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

Premaxillary bones well developed, conjoined, supporting two strong incisors.

Range. Indo-Malayan Subregion.

1. Cheiromeles torquatus.

Cheiromeles torquatus, *Horsfield, Zool. Researches in Java* (1824).
Dysopes cheiropus, *Temm. Monogr. Mammal.* i. p. 218, pl. xvii.
Cheiromeles caudatus, *Temm. l. c.* ii. p. 348, pl. lxvi.

Ears shorter than the head, triangular, with narrowly rounded tips; the inner margin of the ear-conch papillate along upper half as in some species of *Taphozous*; antitragus distinct, rounded; tragus very small, the inner margin not developed, the outer with a small projection near the base. Muzzle long, obliquely truncated, the extremity projecting very considerably beyond the lower jaw. An enormous gular sac extends round half the neck beneath. Into this sack the oily secretion of glands situated between the internal origins of the pectoral muscles is discharged, in males by a series of

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* The following is a synopsis of the characters of these subgenera:—

Gen. MOLOSSUS.

a. Ears more or less united.

a'. Premolars $\frac{2-2}{2-2}$; upper incisors with diverging summits, and with their broad bases close to the canines ..... *Promops*, Gervais.

b'. Premolars $\frac{1-1}{2-2}$; upper incisors parallel by their inner margins, their bases close to the canines ..... *Molossus* (Geoffr.), Ptrs.

b. Ears distinctly separate; upper incisors with diverging summits, their bases removed from the canines by a diastema ..... *Myopterus*, Geoffr.

Gen. NYCTINOMUS.

a. Ears very close or united together; upper lip deeply grooved by vertical wrinkles; premolars $\frac{2-2}{2-2}$ ..... *Nyctinomus* (Geoffr.), Ptrs.

Ears distinctly separate; upper lip slightly wrinkled; premolars $\frac{1-1}{2-2}$ ..... *Mormopterus*, Ptrs.

small pores collected in two circular slightly elevated patches, in females by a single large orifice (Plate XXI. figs. 1, 1*a*).

First toe very thick, with long curved hairs on the outer side. This toe is separated from the others like a thumb, and is probably opposable to them. Wing-membrane from the middle of the tibia and from the sides of the back near the spine. A deep axillary pouch is formed, *in both male and female*, by an extension of a fold of skin, derived from the thick integument covering the breast and sides of the body, to the inferior surface of the humerus, and, longitudinally, to the femur. In the anterior part of this pouch, on the side of the body, behind the axilla, the mamma is placed.

Tail very thick and long, projecting more than half its length beyond the short interfemoral membrane.

Integument very thick and almost quite naked, with strong plications along lines of flexure and extension; the back is quite naked, but a collar of very short thinly spread hairs nearly surrounds the neck.

Upper incisors strong, placed close together, their extremities converging inwards; the single upper premolar large and tricuspidate; first lower premolar minute, wedged in in the space between the canine and second premolar, which are close together; the last upper molar less than half the size of the second molar.

Length, head and body 5″·3, tail 2″·6, head 1″·8, ear 1″·2, tragus 0″·15, forearm 3″·1, thumb 0″·8, third finger 7″, fourth finger 5″·6, fifth finger 3″·1, tibia 1″·4, foot 1″·05.

Hab. Malay Peninsula (Pinang; Singapore); Sumatra; Java; Borneo.

This most remarkable species, the only known representative of the genus, differs altogether from all the species of this group inhabiting the Eastern Hemisphere, and appears to be most closely allied to some of the species of the genus *Molossus*, which is limited to America. In no species of Bat is the gular glandular apparatus so greatly developed and so different in structure according to sex, and in none also is the integument of the body so remarkably thickened and devoid of hair. The nursing-pouches are also peculiar to this species, and are probably absolutely necessary for the preservation of the young, which could scarcely otherwise succeed in maintaining its hold on the naked body of the mother during flight. It is interesting to find these pouches developed in both male and female; for their presence in the former suggests the idea that, where two young are born together, the male may relieve the female of the charge of one of them, as I have shown is most probably the case in *Cynonycteris grandidieri* and in *Cynopterus marginatus* (vide *antè*, pp. 79 & 83).

a. ad. sk.	N.W. Borneo.	Mr. H. Low [C.].
b. ad. sk.	Malacca.	Purchased.
c. ♀ ad., al.	Borneo.	Lords of the Admiralty.
d. ♂ ad., al.	Borneo.	Purchased.
e. skull of *b*.		
f. skeleton.	Borneo.	Sir E. Belcher [C.].

12. MOLOSSUS.

Molossus, *Geoffroy, Ann. du Muséum*, vi. (1805) p. 154; *Peters, MB. Akad. Berl.* 1865, p. 574.
Dysopes, *Illiger, Prodr. Syst. Mammal.* (1811) p. 122.

Ears close together or united at the bases of their inner margins; tragus very short, sometimes minute; extremity of the muzzle broad, obtuse, or very obliquely truncated; lips smooth or with very indistinct vertical wrinkles; first and fifth toes much thicker than the others, the backs of all the toes with long curved hairs.

Dentition. Inc. $\frac{2}{2}$ or $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{1-1}{2-2}$ or $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Premaxillary bones well developed, united; upper incisors strong, their cusps close together in front.

Range. Tropical and subtropical regions of America.

Synopsis of the Species.

I. Muzzle rounded in front; lips smooth, not wrinkled; tragus triangular or linear.
  a. Antitragus circular, as high as long.
    a'. Tragus triangular, with a broad base; inner margins of the ears arising from the forehead by separate points of origin; inc. $\frac{2}{4}$, pm. $\frac{1-1}{2-2}$.
      a''. Ears obtusely pointed.
        α. Centre of breast and abdomen pale yellowish brown; forearm 1″·2 ..... 1. *M. temminckii*, p. 408.
      b''. Ears rounded off above.
        β. Centre of breast and abdomen white; forearm 1″·35 ..... 2. *M. planirostris*, p. 408.
        γ. Centre of breast and abdomen not different from sides; forearm 1″·7 ..... 3. *M. brachymeles*, p. 410.
    b'. Tragus linear, subacutely pointed; inner margins of the ears arising from the same point, or very close together.
      c''. Inc. $\frac{2}{2}$, pm. $\frac{1-1}{2-2}$; the first lower premolar half internal to the tooth-row, partially concealed by the much larger second premolar.
        δ. Fur very short; forearm 1″·7–2″·1 ..... 4. *M. rufus*, p. 410.
      d''. Inc. $\frac{2}{4}$, pm. $\frac{2-2}{2-2}$; the first lower premolar in the tooth-row.
        ε. Fur moderately long; forearm 2″·0 ..... 5. *M. nasutus*, p. 414.
  b. Antitragus half-oval or half-cordate, longer than high, tragus linear; inc. $\frac{2}{4}$, pm. $\frac{2-2}{2-2}$.
    ζ. Forearm 2″·45 ..... 6. *M. abrasus*, p. 415.

II. Muzzle very obliquely truncated, its superior and external front margins formed by the sharply cut cartilaginous rims of the nostrils; lips smooth or very slightly wrinkled; tragus quadrate; inc. $\frac{2}{4}$, pm. $\frac{2-2}{2-2}$.

a. Ears longer than the head; gular sac large; first upper premolar external.
η. Forearm 2″·9 ..... 7. *M. perotis*, p. 416.

b. Ears shorter than the head; gular sac small; first upper premolar in the tooth-row.
θ. Upper lip smooth; forearm 2″·35. 8. *M. glaucinus*, p. 417.
ι. Upper lip slightly wrinkled; forearm 1″·8 ..... 9. *M. bonariensis*, p. 419.

Inc. $\frac{2}{4}$, *pm.* $\frac{1-1}{2-2}$; *ears separate*; *tragus triangular.*
(Subgenus MYOPTERUS, Geoffr.)

1. Molossus temminckii.

Dysopes temminckii, *Lund, Burmeister, Thiere Brasiliens*, p. 72 (1854).
Molossus (Molossops) temminckii, *Peters, MB. Akad. Berl.* 1865, p. 575.
Molossus temminckii, *Dobson, P. Z. S.* 1876, p. 707.

Ears rather small, pointed, their inner margins arising from the forehead by separate points of origin; antitragus circular; tragus short and obtuse, with a broad base. Extremity of the nose slightly prominent, broad, and flat, with an obtuse projection between the nasal orifices, but without arched ridges above them; lips smooth, with a few straight hairs.

Fur, above, reddish brown at the extremities, the base of the hairs yellowish white; beneath, similar, but paler. Integument and membranes dark throughout.

Calcanea very long, reaching almost to the tail.

Length, head and body 1″·5, tail 1″, tail free from membrane 0″·5, forearm 1″·2, calcaneum 0″·65.

Hab. Brazil (Lagoa Santa).

The above description has been taken from the original description by Burmeister, as I have not seen the type.

2. Molossus planirostris.

Molossus (Molossops) planirostris, *Peters, MB. Akad. Berl.* 1865, p. 575.
Molossus planirostris, *Dobson, P. Z. S.* 1876, p. 707.

Ears much shorter than the head, their inner margins arising from the sides of the superior surface of the face above and in front of the

eyes, their points of origin widely separate; upper three fourths of inner and outer margin regularly convex, forming almost an arc of a circle; keel of the ear-conch very slightly developed: tragus short, triangular, with a broad base, acutely pointed, inner margin straight; antitragus large and round, very similar in shape and size to that of *M. rufus* (p. 410), but its base is somewhat broader: muzzle flat, smooth and naked above, extremity obtuse, not obliquely truncated; the margins of the nasal apertures not prominent, placed high above the margin of the upper lip; lips smooth, not wrinkled. A distinct, but not large, gular sac in male, rudimentary or absent in female.

Wings from the distal third of the tibiæ.

Fur very short; above, dark brown, the bases of the hairs white; beneath, along the sides of the body, brown; the chin, neck, and a broad longitudinal band on the chest and abdomen yellowish white. The fur of the body extends upon the wing-membrane above and beneath, nearly as far outwards as a line drawn from the middle of the humerus to the middle of the femur, the remainder of the membrane nearly naked; a few fine hairs appear behind the distal half of the forearm on the upper surface, and clothe the proximal third of the fifth metacarpal bone; beneath, the wings are quite naked except along the sides of the body.

Upper incisors long, the centres of their inner sides close together, their bases and summits separated; lower middle incisors slender, with grooved crowns; outer incisors very small, between the middle incisors and the canines, and not grooved. First upper premolar large, close to the canine, with a large anterior and internal basal cusp, and a smaller cusp posterior and external; lower canines, on each side, with a small internal basal cusp which nearly touches its fellow of the opposite side.

Length (of an adult ♂), head and body 2″·3, tail 1″·2, tail free from membrane 0″·4, head 0″·85, ear 0″·6, tragus 0″·15 × 0″·1, forearm 1″·35, thumb 0″·25; third finger—metacarp. 1″·35, 1st ph. 0″·6, 2nd ph. 0″·65; fourth finger—metacarp. 1″·25, 1st ph. 0″·5, 2nd ph. 0″·2; fifth finger—metacarp. 0″·85, 1st ph. 0″·4, 2nd ph. 0″·15; tibia 0″·4, foot 0″·3.

Hab. Brazil (Buenos Ayres; Barra do Rio Negro); British Guiana (Berbice).

a. ♂ ad., al.	Berbice.	Purchased.
b. ad. sk.	River Cupari, Amazons.	H. W. Bates, Esq. [C.].

The next species is probably identical with *Myopterus daubentonii*, Geoffroy (Descr. de l'Égypte, ii. p. 113), with which it agrees very closely in the length of its skull, the only remnant of the type of that species, which therefore cannot be accurately determined. Of this skull Prof. Peters (MB. Akad. Berl. 1869, p. 402) has given the following measurements:—"Length 0″·85, width across zygomatic arches 0″·5, length of upper tooth-row (not including incisors) 0″·32, length of lower tooth-row 0″·35."

3. Molossus brachymeles.

Molossus (Molossops) brachymeles, *Peters, MB. Akad. Berl.* 1865, p. 575.
Molossus brachymeles, *Dobson, P. Z. S.* 1876, p. 708.

Appears to differ from the preceding species only in being conspicuously larger, in the different colour of the fur of the under surface, and in its slightly different distribution.

Fur, above, dark brown, the base of the hairs paler; beneath, reddish brown. The antebrachial membrane is covered with a small patch of fur along the forearm; and the wing-membrane between the metacarpal bones of the last two fingers and the forearm. Beneath, the fur of the body extends upon the wing-membrane along the sides of the body only; the remaining parts are quite naked.

Total length 4″, head 0″·9, ear 0″·6, forearm 1″·7, middle finger 3″·4, tibia 0″·5, foot 0″·46.

Hab. Peru.

The above is taken from Prof. Peters's description of the only specimen known, a stuffed skin, preserved in the Neuchâtel Museum.

Inc. $\frac{2}{2}$, *pm.* $\frac{1-1}{2-2}$; *ears close together*; *tragus linear*.

(Subgenus Molossus, Ptrs.)

4. Molossus rufus.

Molossus rufus, *Geoffroy, Ann. du Mus.* vi. (1805) p. 154; *Peters, MB. Akad. Berl.* 1865, p. 575; *Dobson, P. Z. S.* 1876, p. 709.
Molossus ursinus, *Spix, Simiar. et Vespert. Brasil.* (1823) p. 58, pl. xxv. fig. 4; *Peters, l. c.* 1865, p. 588, pl. figs. 3, 3*c* (skull).
Dysopes alecto, *Temminck, Monogr. Mammal.* i. p. 231.
Dysopes holosericeus *et* albus, *Natt. Wagner, Wiegm. Archiv*, 1843, p. 368 (vide *Peters, MB. Akad. Berl.* 1866, p. 22).
Dysopes ursinus, *Wagner, Suppl. Schreb. Säugeth.* v. p. 709 (1855).

Ears much shorter than the head, their inner margins arising close together, slightly in front of a line drawn between the eyes, from a point on the forehead, from which a sharp ridge passes forwards on the face to the nose; outer and inner margins of the ear-conch convex, forming almost a regular semicircle; antitragus circular, arising by a narrow base, from which it expands equally anteriorly and posteriorly; tragus minute, linear, acutely pointed; extremity of the muzzle obtuse, rounded, projecting beyond the lower jaw; the nasal apertures directed forwards and slightly outwards, separated by a considerable interval (which is covered with short, erect hairs dilated at their extremities) from the margin of the lip, beyond which the extremity of the nose scarcely projects; lips thick, smooth, without wrinkles.

In the male the opening of a large glandular sac directed forwards is found opposite the anterior extremity of the sternum; in the female this sac is much smaller.

Wings from the ankles.

Fur very short; deep reddish brown above and beneath. The face and ears are nearly naked. On the upper surface the wing-membrane is covered as far as a line drawn from the middle of the humerus to the middle of the femur, and short fur extends upon half the antebrachial membrane, and behind the distal two thirds of the forearm to the carpus, covering also the angle between the fourth and fifth metacarpal bones; behind, the base of the interfemoral membrane also is covered. Beneath, the fur of the body extends upon the wing-membrane almost as far outwards as a line drawn from the elbow to the knee; and a band passes outwards behind the elbow, becoming gradually wider towards the carpus till it occupies a space there extending from the forearm to the middle of the metacarpal bone of the fifth finger, beyond which it passes and occupies the angle between it and the metacarpal of the fourth finger, being limited in its extent outwards by the muscular band extending to the wing-membrane in this position; a small space between the proximal extremity of the fifth metacarpal and the short muscular band, extending from the end of the forearm to the wing-membrane, is naked.

Upper incisors moderately long and acutely pointed, converging inwards and forwards, their bases touching the canines, their inner sides approximated, at the outer side of the base of each tooth a small blunt projection from the cingulum, which touches the canines; the single upper premolar large and close to the canine; lower incisors two, bifid, in front of the closely approximated canines, which have each a broad internal basal cusp; first lower premolar scarcely half the size of the second, which it lies so close to as to be with difficulty distinguished in recent specimens as a separate tooth, its outer and posterior side is partially covered by the obliquely directed cingulum of the second premolar; last upper molar narrow, less than half the size of the antepenultimate molar.

Length (of an adult ♂), head and body 3″·5, tail 2″, head 1″·2, ear 0″·65, tragus 0″·1, forearm 2″·1, thumb 0″·4; third finger—metacarp. 2″, 1st ph. 1″·05, 2nd ph. 1″·15; fourth finger—metacarp. 1″·95, 1st ph. 0″·9, 2nd ph. 0″·2; fifth finger—metacarp. 1″·3, 1st ph. 0″·55, 2nd ph. 0″·25; tibia 0″·7, foot 0″·5.

Hab. Mainland of Tropical America (Rio de Janeiro; Pernambuco; Para; Rio Negro; Dutch Guiana; Oaxaca).

a, b. ♂ & ♀ ad., al.	Oaxaca, Mexico.	Purchased.
c. ♀ ad., al.	Choctan.	Purchased.
d. ♂ ad., al.	Pernambuco.	J. P. G. Smith, Esq. [P.].
e. ♀ ad., al.	Brazil.	
f, g. ♀ ad., al.		M. Lidth de Jeude.
h. skeleton.	Brazil.	

Var. α (*Molossus obscurus*).

Molossus obscurus, *Geoffroy, Ann. du Mus.* vi. p. 154 (1805); *Gervais, Expéd. du Comte de Castelnau, Zoologie,* p. 58, pl. xii. fig. 5 (skull) (1857); *Peters, M.B. Akad. Berl.* 1865, p. 575; *Dobson, P. Z. S.* 1876, p. 710.

Molossus longicaudatus, *Geoffroy, l. c.*

Molossus acuticaudatus, *Desm. Mammal.* p. 116 (1820) (vide *Peters, l. c.* 1869, p. 402).

Dysopes velox, *Natt., Temminck, Monog. Mammal.* i. p. 234 (1827); *Wagner, Suppl. Schreb. Säugeth.* i. p. 476 (1844), v. p. 712 (1855); *Burmeister, Thiere Brasiliens,* Th. i. p. 71 (1854).

Molossus velox, *Gray, Mag. Zool. & Bot.* ii. (1838) p. 501.

Molossus fuliginosus, *Gray, l. c.*

Molossus tropidorhynchus, *Gray, Ann. & Mag. Nat. Hist.* 1839, p. 5.

Dysopes olivaceo-fuscus, *Natt., Wagner, Abh. Münch. Akad.* v. p. 202 (1844) (vide *Peters, l. c.* 1866, p. 22).

Dysopes fumarius, *Burmeister, l. c.* p. 71.

Molossus fumarius, *Gosse* (non *Spix*), *Nat. Sojourn in Jamaica,* p. 292 (1851); *Osburn, P. Z. S.* 1865, p. 79.

Quite similar to *M. rufus* in structure, but much smaller, the forearm constantly measuring 1″·7 or less, as compared with 2″·1. The fur covering the wing-membrane between the humerus and forearm extends somewhat further outwards, and the upper incisors are closer together. Colour variable, from intense brown to fulvous, rather lighter beneath; ears and all membranes black. The female does not differ in size or colour from the male (Gosse), but may be at once distinguished by the small size of the gular gland. It will probably be found hereafter, when a sufficiently large number of specimens are available for examination, that the above-named differences are unimportant, and that the only real difference consists in size.

Length (of an adult ♂), head and body 2″·7, tail 1″·6, head 0″·85, ear 0″·55, tragus 0″·08, forearm 1″·65, thumb 0″·3; third finger —metacarp. 1″·6, 1st. ph. 0″·75, 2nd ph. 0″·6; fourth finger— metacarp. 1″·55, 1st ph. 0″·65, 2nd ph. 0″·15; fifth finger— metacarp. 0″·95, 1st. ph. 0″·48, 2nd ph. 0″·2; tibia 0″·55, foot 0″·4.

Hab. Tropical America and its islands, apparently generally distributed. Found in Peru at an elevation of 9000 feet.

The habits of this variety (which are probably generally similar to those of the larger form of this species) have been observed in Jamaica by Mr. P. H. Gosse and Mr. W. Osburn (*vide* references in synonymy above). It inhabits the hollow trunks of palms and other trees, and also the roofs of houses. Mr. Gosse remarks that it is more active on the ground than any other species. On the least touch it ran, or rather crawled, about with such agility that it was not easy to seize it. When running it rests on the wrists, elevating the front of the body considerably. The males congregate together. This is probably the case in all species of Bats, the males approaching the females during the breeding-season only. Mr. Osburn notices that during the breeding-season the gular glands in the male are humid and swollen, opening on pressure like two lips; and a very

active circulation is visible through the internal skin when this is opened, giving the appearance of inflammation. He also found that the males and females live apart, even when inhabiting the same tree. In the hollow trunk of a palm two colonies were discovered, one consisting of from 150 to 200 individuals exclusively males, while the other was composed of females, with a male here and there among them.

a, *b*. ♂ & ♀ ad., al.	Cuba.	W. S. MacLeay, Esq. [P.].
c–*g*. ♂ & ♀ ad., al.	Hayti.	J. Hearne, Esq. [P.].
h, *i*. ad. sks.	Jamaica.	J. Gould, Esq. [P.].
j, *k*. ad. sks.	Jamaica.	P. H. Gosse, Esq. [C.].
l–*q*. ♂ ad., al.	Jamaica.	P. H. Gosse, Esq. [C.].
r. ♂ ad., al.	Mt. Edgecombe, Jamaica.	P. H. Gosse, Esq. [C.].
s. ♀ ad., al.	Jamaica.	J. Bell, Esq. [P.].
(Type of *Molossus fuliginosus*, Gray.)		
t. ♂ ad., al.	Isle of St. Thomas.	Capt. Sawyer [P.].
u. ♂ ad., al.	Isle of St. Lucia.	Miss R. Alexander [P.].
v, *w*. ♂ & ♀ ad., al.	Isle of Grenada.	Purchased.
x. ♂ ad., al.	Trinidad.	Purchased.
y. ad. sk.	VeraPaz,Guatemala.	O. Salvin, Esq. [C.].
z. ♀ ad., al.	South America.	Sir R. Schomburgk [P.].
a'. ♂ ad., al.	British Guiana.	Sir R. Schomburgk [P.].
b', *c'*. ♂ ad., al.	British Guiana.	Purchased.
d'. ♂ ad., al.	South America.	Mr. Brandt [C.].
e'. ♀ ad., al.	Surinam.	Purchased.
f'–*h'*. ♂ & ♀ ad., al.	Surinam.	Mr. Bartlett [C.].
i'–*m'*. imm. & ad. sks.	Pernambuco.	J. P. G. Smith, Esq. [P.].
o', *p'*. ad. sks.	Para.	R. Graham, Esq. [P.].
(Labelled *Molossus fulcus*, Gray.)		
q'–*t'*. ♂ & ♀ ad., al.	Para.	R. Graham, Esq. [P.].
u'. ♀ ad., al.	Portobello.	Lords of the Admiralty [P.].
v'–*x'*. ad. sks.	Bahia.	Comte de Castelnau [P.].
y'. ♀ imm., al.	Santarem, Amazons.	H. W. Bates, Esq. [C].
z'. ♀ ad., al.	Upper Amazons.	Purchased.
a''. ♂ ad., al.	Brazil. (*M. velox*, Gray.)	
b''. ♂ ad. sk.	Brazil.	Mrs. Parker [P.].
c''. ♀ ad., al.	Ecuador.	— Bollaert, Esq. [P.].
d''. ♀ ad., al.	Ecuador.	Mr. Fraser [C.].
e''. ♀ ad., al.	Huasampilla, Peru (9000 feet).	Purchased.
f''–*h''*. ad. sks.	Bolivia.	Mr. Bridges [C.].
i''. ad. sk.		St. George Mivart, Esq. [P.].
j''. ad. sk.		Mr. Fraser [C.].
k'', *l''*. ♂ & ♀ ad., al.		M. Lidth de Jeude [C.].
m''–*o''*. ♂ & ♀ juv. et ad., al.		
p'', *q''*. ♂ & ♀ ad., al.		
r'', *s''*. ♂ ad., al.		
t''–*v''*. ad. sks.		Earl of Derby [P.].
w''. ad. sk.	Bermuda.	T. Cottle, Esq. [P.].
x'', *y''*. skulls.	Jamaica.	P. H. Gosse, Esq. [C.].
z''–*b'''*. skulls of *f''*–*h''*.		
c'''. skeleton.	Jamaica.	P. H. Gosse, Esq. [C.].

Inc. $\frac{2}{4}$, *pm.* $\frac{2-2}{2-2}$; *ears united*; *tragus linear or quadrate.*
(Subgenus PROMOPS, Gervais.)

5. Molossus nasutus.

Molossus nasutus, *Spix, Simiar. et Vespert. Brasil.* p. 58, pl. xxxv. fig. vii. (1823); *Peters, MB. Akad. Berl.* 1865, p. 578, pl. figs. 4, 4 *c* (skull); *Dobson, P. Z. S.* 1876, p. 711.
Molossus fumarius, *Spix, l. c.* figs. v. and vi.
Promops ursinus, *Gervais* (non *Spix*), *Expéd. du Comte de Castelnau, Zoologie, Mammif.* p. 59, pl. xii. figs. 3, 3 *a* (dentition) (1855).

Ears much shorter than the head; laid forwards the inner margin of the conch extends slightly further than halfway between the eye and end of the muzzle; inner margins less than one tenth of an inch apart at their bases, uniting on the muzzle in a prominent rounded ridge, which ends abruptly at a short distance behind and above the nostrils; inner and outer margins of the ear-conch continuous, forming almost an arc of a circle; ear-keel short, thickened, but not expanded beneath, clothed posteriorly with short hairs; antitragus circular, with a narrow base, as in *M. rufus*, but thickened and expanded above and posteriorly, so that its very convex superior and posterior margin projects backwards considerably beyond its base; tragus very small, as in *M. rufus*, with a minute projection at the outer side of its base; muzzle very obtuse in front, nearly vertically truncated; nostrils directed forwards and slightly outwards, connected above by an ill-defined ridge, which does not extend downwards between them; the wide space between the nostrils and the margin of the upper lip occupied by a quadrilateral patch of thickly spread short hairs, the sides of the muzzle almost naked. A large gular sac in male, as in *M. rufus* (Plate XXI. fig. 2).

Wings from the ankles; interfemoral membrane deep, including quite three fourths of the tail.

Fur moderately long, but conspicuously longer than in *M. rufus*; dark brown above, paler beneath; the base of the hairs whitish on both surfaces. On the upper surface a band of short fur, commencing in a narrow line at the beginning of the middle third of the forearm, increases in width outwards so as to cover the proximal third of the fifth metacarpal bone and the fourth of the fourth metacarpal, occupying also the portion of wing-membrane between; beneath, the wing-membrane, between the humerus and femur, is thickly covered, and a band of fur 0″·3 wide extends outwards behind the forearm to the fifth metacarpal bone and to the wing-membrane beyond it, covering half the bone.

Upper incisors touching by their inner margins, their summits slightly separated; the broad base of each tooth nearly fills up the interval between the canine and the centre of the intercanine space, and develops externally a small basal cusp which touches the cingulum of the canine; lower incisors very small, in the space in front of the projecting cingula of the closely approximated lower canines, the middle pair bifid, the outer incisors very small and

between them and the canines; first upper premolar minute, quite external to the tooth-row; the second premolar much exceeding the molars in vertical extent, and close to the canine; first lower premolar about one third the size of the second, standing in the tooth-row.

Length (of an adult ♂), head and body 3″·1, tail 2″·1, free from membrane 0″·7, head 0″·9, ear 0″·6, tragus 0″·08 × 0″·02, forearm 2″, thumb 0″·3; third finger—metacarp. 2″·05, 1st. ph. 0″·95, 2nd ph. 0″·95; fourth finger—metacarp. 2″, 1st ph. 0″·75, 2nd ph. 0″·15; fifth finger—metacarp. 1″·2, 1st. ph. 0″·5, 2nd ph. 0″·22; tibia 0″·7, foot 0″·4.

Hab. Brazil; Central America (Guatemala).

This species is quite intermediate between *M. rufus* (subg. *Molossus*) and *M. abrasus* (subg. *Promops*), agreeing with the former in the form of the ear and even in the distribution of the fur, with the latter in the form and number of the teeth.

a. ♂ ad., al. Dueñas, Guatemala. O. Salvin, Esq. [C.].

—6. **Molossus abrasus.**

? Molossus ater, *Geoffroy, Annal. du Mus.* vi. p. 153 (1805).
Dysopes abrasus, *Temminck, Monogr. Mammal.* i. p. 232 (1827); *Wagner, Suppl. Schreb. Säugeth.* i. p. 475 (1844).
Dysopes longimanus, *Wagner, Wiegm. Archiv*, 1843, p. 367.
Dysopes leucopleura, *Wagner, l. c.*; *Burmeister, Thiere Brasiliens*, p. 73 (1854).
Molossus abrasus, *Peters, MB. Akad. Berl.* 1865, p. 574; *Dobson, P. Z. S.* 1876, p. 712.

Ears much shorter than the head, but conspicuously larger than in *M. rufus*, united by their bases only on the muzzle at a point equally distant from the anterior commissure of the eyelids and the nostrils; outer and inner margins of the ear regularly convex, forming together almost a perfect arc of a circle; antitragus half-cordate, with a broad base, separated behind by a deep notch; keel of the ear-conch well-developed, thickened, and expanded externally in lower half (Plate XXI. fig. 3); tragus minute, linear, subacutely pointed, slightly larger than in *M. rufus*, but with a broad base.

Muzzle obtuse; nasal apertures directed forwards and slightly outwards, the end of the nose scarcely projecting beyond the margin of the upper lip, which is separated from the margin of the nostrils by a space less wide than in *M. rufus*; the external margins of the nostrils more prominent than in that species, and continued upwards and inwards above the nasal apertures and downwards between them in a conjoined ridge to the margin of the lip; the upper margin of the nasal disk thus formed on each side is finely and evenly toothed, and the internasal ridge covered with short spoon-shaped hairs, similar to those forming a broad patch between the nostrils and upper lip in *M. rufus*, but strictly limited to this ridge; the margin of the upper lip in front is fringed with straight hairs.

Wings from the ankles or from the tibiæ slightly higher up. Gular sac distinct in males, rudimentary in females (Plate XXI. fig. 3).

Fur short, and intensely black above and beneath. The muzzle in front of the ears is nearly naked, also the inferior surface of the lower jaw. The fur of the body extends upon the wing-membrane above almost as far as a line drawn from the middle of the humerus to the knee-joint; beneath, as far as a line drawn from the middle of the humerus to the middle of the femur; a small patch of fur appears on the upper surface of the antebrachial membrane near the forearm, and the base of the interfemoral is covered, but the remainder of the membranes are naked.

Upper incisors close together, parallel; lower incisors very small, bifid, the outer incisor on each side concealed between the middle incisor and the base of the canine; inner basal cusps of the lower canines almost touching behind the incisors, as in *M. rufus*. First upper premolar very small, scarcely raised above the gum, and scarcely visible without the aid of a lens, in the small space between the canine and second premolar, but close to the outer margin of that space; in another specimen this small premolar is larger and outside the tooth-row, though a narrow space still intervenes between the canine and the second premolar.

Length (of an adult ♀), head and body 3″·25, tail 1″·8, tail free from membrane 0″·9, head 1″·15, ear 0″·8, tragus 0″·12, forearm 2″·45, thumb 0″·45; third finger—metacarp. 2″·4, first ph. 1″·1, second ph. 1″·3; fourth finger—metacarp. 2″·3, first ph. 0″·9, second ph. 0″·4; fifth finger—metacarp. 1″·2, first ph. 0″·8, second ph. 0″·35; tibia 0″·7, foot 0″·4.

Hab. Brazil (Mato Grosso; Barra do Rio Negro); Surinam; Peru.

This species at first sight resembles *M. rufus*, with which it nearly agrees in size and colour; but the very different form of the antitragus and muzzle at once distinguish it.

a. ♀ ad., al.	Coban.	O. Salvin, Esq. [C.].
b. ad. sk.	Central America.	Purchased.
c. ad. sk.	Demerara.	Sir R. Schomburgk [P.].
d, *e*. ♂ & ♀ ad., al.	Surinam.	Purchased.
f. ad. sk.	Cayenne.	
g. ♀ ad., al.		M. Lidth de Jeude [C.].
h. ♀ ad., al.		
i. skeleton.	Coban, Guatemala.	O. Salvin, Esq. [C.].

7. Molossus perotis.

Dysopes perotis, *Wied, Beitr. Naturg. Brasil.* ii. (1825) p. 227; *Wagner, Suppl. Schreb. Säugeth.* i. p. 473, v. p. 708; *Burmeister, Thiere Brasiliens*, p. 68 (1854).

Dysopes rufus, *Temm.* (non *Geoffr.*), *Monogr. Mammal.* i. p. 230 (1835–41).

Dysopes (Molossus) gigas, *Peters, MB. Akad. Berl.* 1864, p. 381.

Molossus (Promops) perotis, *Peters, l. c.* 1865, p. 574.

Molossus perotis, *Dobson, P. Z. S.* 1876, p. 713.

Ears very large, united in front; laid forwards they extend beyond the extremity of the nose; the outer and inner margins of

the ear-conch regularly circular; antitragus much longer than high, convex, separated posteriorly by an angular notch; tragus quadrate with rounded angles, no prominent lobule at the base of the outer margin; keel of the ear-conch well developed, thickened and flattened externally.

Muzzle very obliquely truncated, the extremity of the nose projecting much beyond the retracted upper lip, which is also concealed by a fringe of short hairs; nasal apertures directed forwards and downwards; the cartilaginous sharply cut edges of the nostrils projecting laterally and above, terminating the muzzle in front; sides of the face behind the eyes in front of the ears much flattened, in front of the eyes prominent, convex, concealing the eyes when viewed anteriorly; lips smooth, without vertical wrinkles; sides of the lips very thick, the outer edge exceeding the inner in length, fringed with short fine hairs.

Gular sac large in male, rudimentary in female.

Wings from the lower end of the tibia.

Fur above reddish brown, paler, almost buff, at the base of the hairs; beneath much paler.

On the upper surface the wing-membrane is covered as far as a line drawn from the middle of the humerus to the knee; and a band of fur extends from the commencement of the middle third of the forearm along its posterior margin to the metacarpal bone of the fourth finger, covering one third of its length, and passing across it to the angle between it and the metacarpal of the third finger; beneath, the wing-membrane external to the humerus is naked.

First upper premolar minute, in the outer angle between the canine and second premolar; lower incisors crowded, bifid.

Length, head and body about 5″, tail 2″·8, ear 1″·5, tragus 0″·2 × 0″·1, forearm 2″·9, thumb 0″·45; third finger—metacarp. 3″, 1st ph. 1″·35, 2nd ph. 1″·6; fourth finger—metacarp. 2″·9, 1st ph. 1″·15, 2nd ph. 0″·25; fifth finger—metacarp. 1″·65, 1st ph. 0″·9, 2nd ph. 0″·35; foot 0″·65.

Hab. Brazil (Lagoa Santa, Parahyba, Barra do Rio Negro); Bolivia.

a. ad. sk.	Brazil.	Purchased.
b. ad. sk.	Bolivia.	Mr. Bridges [C.].
c. skull of *b*.		

8. Molossus glaucinus.

Dysopes glaucinus, *Natt.*, *Wagner*, *Wiegm. Archiv*, 1843, p. 368; *Suppl. Schreb. Säugeth.* v. p. 710 (1855); *Burmeister*, *Thiere Brasiliens*, p. 73 (1854); *Peters*, *MB. Akad. Berl.* 1866, p. 22.

Molossus ferox, *Gundlach*, *MB. Akad. Berl.* 1861, p. 149; *Peters*, *l. c.* 1865, p. 574.

Molossus glaucinus, *Dobson*, *P. Z. S.* 1876, p. 714, fig. 2.

In the form of the muzzle and ears very similar to the preceding species, but the ears are comparatively much smaller; laid forwards the inner margin of the ear-conch reaches to within one tenth of an

inch from the extremity of the muzzle; inner margins of the ears united by their bases on the muzzle at a point nearer to the extremity of the nose than to the anterior commissure of the eyelids; outer and inner margins of the conch regularly convex; antitragus separated by a deep and narrow emargination, commencing anteriorly in a plane slightly above the angle of the mouth; tragus small, quadrate, superior margin straight, outer and inner margins concave, no projecting lobule at the base of the outer margin; keel of the ear-conch as in *M. perotis*, terminating posteriorly and inferiorly in a deep and thick flattened ridge, which is in the same perpendicular line with, and almost touches, the antitragus.

A small gular sac in male, rudimentary in female; opening directed downwards and slightly forwards.

Wings from the ankles.

Distribution of fur upon the wing-membranes as in *M. perotis*. Above, light brown at the base of the hairs, then chestnut-brown, the extreme tips greyish, so that the upper surface appears altogether grey; beneath similarly coloured, but much paler.

Upper and lower incisors as in *M. perotis*; the first upper premolar scarcely elevated above the gum, in the centre of the space between the canine and second premolar.

Length (of an adult ♀), head and body 3″·1, tail 2″·15, tail free from membrane 1″, head 1″·2, ear 0″·9, tragus 0″·12, forearm 2″·35, thumb 0″·35; third finger—metacarp. 2″·35, 1st ph. 1″, 2nd ph. 1″·2; fourth finger—metacarp. 2″·25, 1st ph. 0″·85, 2nd ph. 0″·3; fifth finger—metacarp. 1″·2, 1st ph. 0″·75, 2nd ph. 0″·35; tibia 0″·8, foot 0″·5.

Hab. Brazil (Mato Grosso); Surinam; Jamaica; Cuba.

This is the Chestnut Mastiff Bat of Gosse*, by whom its habits have been observed in Jamaica. He remarks:—"Soon after sunset we hear the scrambling of little claws along the plaster (in the loft above) gradually tending towards the point where the hole under the eaves is situated. . . . . I judge that they crawl along one after another in a straight line to the outlet, in parties. . . . . The family assured me that, after the Mastiff Bats had emerged a few hours, they invariably returned into the hole again; and they several times directed my attention to them when returning. They return between 8 and 9 o'clock, and issue forth again before the morning twilight.

"When handled its impatience of confinement is manifested by a continuous schreeching, not very loud, but excessively harsh and shrill. The ears are commonly so pendent as completely to cover the eyes; but they are occasionally retracted so as to expose the eyes, especially if the face be touched. There is a gland on the throat with an orifice capable of admitting a small straw; it emits a very rank odour. This orifice is manifest in the female no less than in the male; but I could not detect any odour from it in the former, even though irritated by the insertion of the head of a pin."

* 'A Naturalist's Sojourn in Jamaica,' p. 159 (1851).

a. ♂ ad., al.	Jamaica.	G. E. Dobson, M.B. [E.].
b. ♀ ad., al.	Jamaica.	P. H. Gosse, Esq. [C.].
(The Chestnut Mastiff Bat referred to by Gosse, *op. cit.*)		
c. ♂ ad., al.	Jamaica.	P. H. Gosse, Esq. [C.].
(Red Mastiff Bat of Gosse, *op. cit.*)		
d. ad. sk.	Jamaica.	P. H. Gosse, Esq. [C.].
. ad. sk.	Jamaica.	Mr. Cuming [C.].
f. ad. sk.	Ecuador.	M. Delabrée Bonaparte.
g. ♂ ad. sk.	Bolivia.	Mr. Bridges [C.].
h. skull of *g*.		

9. Molossus bonariensis.

Promops bonariensis, *Peters, MB. Akad. Berl.* 1874, p. 232, pl.
Molossus bonariensis, *Dobson, P. Z. S.* 1876, p. 715.

Ears united by a deeper band than in *M. glaucinus*; ear-conch as broad as high; antitragus broader than high, convex; tragus quadrate, as in the preceding species; muzzle obliquely truncated; extremity of the nose almost double as broad as the base of the antitragus; upper lip with a few shallow vertical wrinkles.

Wing-membrane from the ankles.

Fur rather short, somewhat shorter above than beneath. Beneath, the wing-membrane is covered as far as a line drawn from the middle of the humerus to the knee; a few short hairs extend along the posterior margin of the forearm; above, the outer half of the antebrachial membrane is covered with short woolly hairs, and a band of similar hairs passes outwards behind the forearm, becoming gradually so broad as to cover almost half the metacarpal bone of the last finger. Above, reddish brown, the base of the hairs whitish; paler beneath, the extremities of the hairs brownish white.

The skull agrees in size with that of *M. nasutus*, Spix; but the facial portion is much longer and the brain-case wider than in that species. Upper incisor on each side with a short outer basal cusp, and separated from the canine by a slight interval; first upper small premolar in the space between the canine and second premolar.

Length, head and body 3″, tail 1″·4, tail free from membrane 0″·65, head 1″, ear 0″·6, tragus 0″·12, forearm 1″·8, thumb 0″·34; third finger—metacarp. 1″·8, 1st ph. 0″·7, 2nd ph. 0″·65; fourth finger—metacarp. 1″·7, 1st ph. 0″·6, 2nd ph. 0″·2; fifth finger—metacarp. 0″·65, 1st ph. 0″·55, 2nd ph. 0″·15; tibia 0″·55, foot 0″·44.

Hab. Buenos Ayres.

I have not seen the single specimen (as yet obtained) of this recently described species. I have therefore been obliged to translate Prof. Peters's original description, which is accompanied by an excellent plate.

13. NYCTINOMUS.

Nyctinomus, *Geoffroy, Descript. de l'Egypte*, ii. p. 114 (1812); *Horsfield, Zool. Researches in Java*; *Gray, May. Zool. & Bot.* ii. (1838) p. 500; *Peters, MB. Akad. Berl.* 1865, p. 573; *Dobson, P. Z. S.* 1876, p. 716.

Dinops, *Savi, Nuov. Giorn. de' Lett.* p. 230 (1825); *Bullet. des Scien. Nat.* viii. p. 286 (1826).

Dysopes, *Cretzschmar* (non *Illiger*), *Rüppell, Atlas Reise nördl. Afrika, Zoolog.* (1826) p. 69; *Temminck* (in part), *Monogr. Mammal.* i. p. 226 (1835–41).

Ears united on the muzzle, or close together by the bases of their inner margins; tragus short, quadrate or rounded off above, never linear; extremity of the muzzle broad, very obliquely truncated, projecting considerably beyond the lower lip, terminated by the sharply cut margin of the nostrils; upper lip very expansible, generally deeply grooved with vertical wrinkles; wings and feet as in *Molossus*.

Dentition. Inc. $\frac{2}{6}$ or $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$ or $\frac{1-1}{2-2}$, m. $\frac{3-3}{3-3}$.

Premaxillary bones separate in front, or conjoined by cartilage only; upper incisors close to the canines by their bases, separate in front, their cusps converging inwards and forwards.

Range. Generally distributed throughout the tropical and warmer parts of the temperate zones of both hemispheres.

Synopsis of the Species.

I. Premolars $\frac{2-2}{2-2}$.

a. Integument of the ears thick, opaque; keel of the ear-conch thickened in lower third; antitragus separated by a deep notch.

a'. Lips smooth; inner margins of the ears arising from the muzzle by distinct points of origin; tragus broad, rounded off above.

a. Antitragus irregularly quadrate; forearm 2″·5; lower incisors 4 ..... 1. *N. africanus*, [p. 422.

b'. Lips furrowed by deep vertical wrinkles.

a''. Ears separate or conjoined at the bases of their inner margins only; tragus broad, rounded off above.

a'''. Ears conjoined at the bases of their inner margins; gular sac distinct in ♂.

β. Antitragus obliquely triangular, rounded; forearm 2″·4; lower incisors 6 ..... 2. *N. cestonii*, [p. 423.

b'''. Ears separate; no gular sac.

γ. Antitragus half-oval. [p. 424.

a'. Forearm 1″·95; lower incisors 4 .. 3. *N. ægyptiacus*,

β'. Forearm 2″; lower incisors 6 .... 4. *N. tragatus*, [p. 424.

b''. Ears conjoined by a more or less deep band; tragus small; no gular sac.

c'''. Ears conjoined at the bases of their inner margins.
a. Fur unicoloured; wings from the lower end of the tibiæ; forearm 1''·95 [p. 425. 5. *N. plicatus*,
β. Fur greyish on the surface; wings from the middle of the tibiæ; forearm 1''·9 ..... [p. 426. 6. *N. bivittatus*,
d'''. Ears conjoined by a deep band in front.
a. The first upper premolar stands in the tooth-row.
a'. Lower third of the ear-keel much thickened and flattened externally; forearm 1''·35 ..... [p. 426. 7. *N. brachypterus*,
β'. Lower third of the ear-keel slightly thickened, not flattened externally.
a''. Fur of the chest and abdomen uniform in colour; forearm 1''·5 [p. 427. 8. *N. pumilus*,
β''. Fur of the lower half of the chest and the abdomen white; forearm 1''·5..... [p. 428. 9. *N. limbatus*,
β. The first upper premolar external to the tooth-row.
γ'. Lower third of the ear-keel slightly thickened, not flattened externally. [p. 429.
γ''. Tragus quadrate; forearm 1''·85 10. *N. angolensis*,
δ'. Lower third of the ear-keel much thickened and flattened externally.
δ''. Tragus narrow, much longer than broad, rounded off above; forearm 2''·4 ..... [p. 430. 11. *N. miarensis*,
ε''. Tragus quadrate; forearm 1''·8.. 12. *N. mops*, p. 431.
e'''. Ears conjoined by a very deep band anteriorly, and, posteriorly, by a second low band; forearm 1''·9 ..... [p. 432. 13. *N. johorensis*,
b. Integument of the ears thin, translucent; keel of the ear-conch slender, deep, bent backwards on itself.
a'. Antitragus separated by a deep notch; lower incisors 4.
a''. Muzzle thick, not concave in front of the eyes; upper lip with vertical wrinkles.
a'''. Ears separate; a large gular sac; forearm 2''·35 ..... [p. 433. 14. *N. australis*,
b'''. Ears united by a low band near the extremity of the muzzle; no gular sac; forearm 2''·35 ..... [p. 434. 15. *N. megalotis*,
b''. Muzzle concave between the eyes and the extremity of the nose; upper lip furrowed by deep oblique wrinkles; no gular sac.
c'''. Ears united by a deep band, antitragus much longer than high; forearm 2''·2. [p. 435. 16. *N. macrotis*,
d'''. Ears united by a low band, antitragus as high as long; forearm 1''·8 ..... [p. 436. 17. *N. gracilis*,
b'. Antitragus separated by a very shallow notch; lower incisors 6.
c''. Muzzle flat in front of the ears; upper lips with vertical wrinkles.

e'''. Ears separate.
a. Tragus quadrate, broad above; forearm 1″·7 ..... 18. *N. brasiliensis*, [p. 437.
β. Tragus triangular, narrow above; forearm 1″·35 ..... 19. *N. norfolcensis*, [p. 439.

II. Premolars $\frac{1-1}{2-2}$.
c'. Antitragus separated by a very shallow notch; lower incisors 6.
d''. Muzzle flat or rounded off above; upper lip with ill-defined vertical wrinkles.
f'''. Ears separate; tragus triangular, rounded off above.
a. Ear broad above, upper third of the inner margin straight; forearm 1″·45 20. *N. albiventer*, [p. 440.
β. Ear narrow above, upper third of the inner margin deeply concave; forearm 1″·55 ..... 21. *N. aceta bulosus*, [p. 440.

Premolars $\frac{2-2}{2-2}$; *ears united or close together*. (Subg. NYCTINOMUS, Ptrs.)

1. Nyctinomus africanus.

Nyctinomus africanus, *Dobson, Ann. & Mag. Nat. Hist.* 1876, xvii. p. 348; *P. Z. S.* 1876, p. 719.

Ears large, their inner margins arising from perfectly distinct points of origin, though close together; outer and inner margins of the ear-conch regularly convex, forming an arc of a circle; antitragus irregularly quadrilateral, with a broad base, separated posteriorly by a moderately deep notch, upper margin straight or even slightly concave; tragus broad, evenly rounded off above; keel of the ear very prominent, thickened and flattened externally in lower third (Plate XXII. fig. 1).

Fur bright orange-chestnut, above and beneath. The fur of the body extends upon the wing-membrane above almost as far as a line drawn from the middle of the humerus to the knee, and upon the base of the interfemoral membrane, the remainder of the upper surface is naked; beneath, the fur scarcely extends so far outwards upon the wing-membrane between the humerus and femur as upon the upper surface, but a narrow band of short hairs passes outwards behind the posterior margin of the forearm to the carpus.

Lower incisors four, not crowded; first upper premolar very short and blunt, but occupying by its base the whole space between the canine and second premolar.

Length, head and body 3″·4, tail 2″·4, tail free from membrane 1″·5, head 1″·2, ear 1″, tragus 0″·3 × 0″·15, forearm 2″·5, thumb 0″·4; third finger—metacarp. 2″·4, 1st ph. 1″·1, 2nd ph. 1″·3; fourth finger—metacarp. 2″·15, 1st ph. 0″·9, 2nd ph. 0″·35; fifth finger—metacarp. 1″·25, 1st ph. 0″·75, 2nd ph. 0″·3; tibia 0″·75, foot 0″·45.

Hab. South Africa (Transvaal Republic).

a. ad. sk., al. (type). Transvaal, South Africa. R. B. Sharpe, Esq. [P.].

2. Nyctinomus cestonii.

Dinops cestonii, *Savi, Nuov. Giorn. de' Letter*, p. 230 (1825); *Bullet. des Sci. Nat.* viii. p. 286 (1826); *Temminck, Monogr. Mammal.* i. p. 262 (1835–41).
Dysopes rüppellii, *Temm. l. c.* ii. p. 224.
Dysopes midas, *Sundevall, Stockh. Vetensk. Akad. Handl.* 1842, p. 207.
Dysopes cestonii, *Wagner, Suppl. Schreb. Säugeth.* v. p. 702; var. nigrogriseus, *Schneider, Nuov. Mém. Soc. Helvét.* xxiv. 1871, p. 9.
Nyctinomus insignis, *Blyth, Catal. Mamm. Mus. Asiat. Soc. Beng.* p. 29 (1863).
Nyctinomus (Dysopes) ventralis, *Heuglin, Nov. Acta Acad. Leop.-Carol.* 1861, p. 11.
Dysopes (Molossus) rüppellii, *Swinhoe, P. Z. S.* 1870, p. 619.
Nyctinomus cestonii, *Dobson, Monogr. Asiat. Chiropt.* p. 180, fig. (head) (1876); *P. Z. S.* 1876, p. 719.

Ears united by the bases of their inner margins on the muzzle at a short distance from the extremity of the nose, their round superior and internal margins projecting slightly beyond the end of the muzzle; general form of the ear-conch and tragus as in preceding species, but the tragus is proportionately larger, and the antitragus is obliquely triangular and separated posteriorly by a deep notch. Upper lips very thick, with well-marked vertical wrinkles. Males with a small glandular gular sac, opening in the centre of the inferior surface of the neck, slightly in front of the anterior extremity of the sternum, by a circular orifice concealed by the fur.

Wings from the distal third of the tibia.

Fur, above, reddish brown with an orange tinge, the extreme tips of the hairs greyish; beneath, similar, but paler. The wing-membrane on the upper surface is covered as far as a line drawn from the middle of the humerus to the knee, and the base of the interfemoral membrane; the antebrachial membrane is clothed with short fur; the forearm, legs, and remainder of the wings naked. Beneath, the fur extends outwards to a less distance, ending by an abrupt well-defined straight margin; the antebrachial membrane is naked. The lower margin of the upper lip is fringed with fine hairs, the face is almost naked; a few short hairs form an arch on the inner side of the ear-conch, and the cutaneous band connecting the inner sides of the ears with the muzzle is clothed with erect hairs.

First upper premolar minute, acutely pointed, in the centre of the space between the canine and second large premolar; lower central pair of incisors in front of next two, which touch the small incisors on each side next the canines, but do not overlap them.

Length (of an adult ♂), head and body 3″·4, tail 2″, tail free from membrane 1″·1, head 1″·3, ear 1″·2, tragus 0″·25 × 0″·20, forearm 2″·4, thumb 0″·35; third finger—metacarp. 2″·4, 1st ph. 0″·95, 2nd ph. 1″·25; fourth finger—metacarp. 2″·2, 1st ph. 0″·8, 2nd ph. 0″·5; fifth finger—metacarp. 1″·3, 1st ph. 0″·7, 2nd ph. 0″·3; tibia 0″·75, foot 0″·4.

Hab. Europe (Madeira; Switzerland, Italy, Sicily, Greece); Africa (Egypt, Nubia); Asia (Amoy, China).

a. ad. sk.	Jersey?.	J. F. Snow, Esq. [P.].
b. ♂ ad., al.	Italy.	Prof. Savi [P.].
c. ♂ ad., al.	Sicily.	M. Parzudaki [C.].
d, *e*. ♂ & ♀ ad., al.	Sicily.	
f. ♀ ad., al.	Greece.	Mr. Parreys [C.].
g. ad. sk.		Purchased.

3. Nyctinomus ægyptiacus.

Nyctinomus ægyptiacus, *Geoffroy, Descr. de l'Egypte*, ii. p. 128, pl. ii. (1812); *Dobson, P. Z. S.* 1876, p. 721.
Dysopes geoffroyi, *Temminck, Monogr. Mammal.* i. p. 226 (1835–41); *Wagner, Suppl. Schreb. Säugeth.* i. p. 469 (1844), v. p. 703 (1855).

Much smaller than *N. africanus*. Ears quite separate, but close together by the bases of their inner margins; outer and inner margins of the ear-conch evenly convex, forming almost an arc of a circle above; antitragus half-oval, separated by a deep notch posteriorly; tragus broad and rounded off above, as in the preceding species. Lips with vertical wrinkles. No gular sac in male or female.

Wing-membrane from the lower part of the tibiæ near the ankles.

Fur, deep smoke-brown above, paler beneath. Distribution of hair on the membranes as in *N. cestonii*, except on the antebrachial membrane, which is nearly naked.

Length (of the type, an adult ♂ specimen preserved in alcohol), head and body 2″·6, tail 1″·6, tail free from membrane 0″·9, head 0″·95, ear 0″·9, tragus 0″·23 × 0″·15, forearm 1″·95, thumb 0″·28; third finger—metacarp. 1″·9, 1st ph. 0″·75, 2nd ph. 0″·8; fourth finger—metacarp. 1″·8, 1st ph. 0″·6, 2nd ph. 0″·4; fifth finger—metacarp. 1″·15, 1st ph. 0″·55, 2nd ph. 0″·3; tibia 0″·5, foot 0″·35.

Hab. Africa (Egypt).

Type in the collection of the Paris Museum.

4. Nyctinomus tragatus.

Nyctinomus tragatus, *Dobson, J. A. S. B.* 1874, p. 143; *Monogr. Asiatic Chiroptera*, p. 181 (1876); *P. Z. S.* 1876, p. 721.

This species resembles *N. ægyptiacus* very closely, but is larger, and has always six lower incisors. That this is not due to age (as the young have generally six lower incisors, even in species in which four is the normal number in the adult animal) is shown by the relative measurements of this species and *N. ægyptiacus*, and by the presence in every specimen (as yet examined) of this species of six lower incisors. (Plate XXII. fig. 2, ear.)

Length, head and body 2″·9, tail 1″·7, tail free from membrane 0″·85, ear 0″·9, tragus 0″·23 × 0″·15, forearm 2″, third finger 3″·6, fifth finger 1″·9, tibia 0″·6, foot 0″·35.

Hab. Peninsula of India (Rajanpur, N.W. Frontier; Jashpur, near Chutia Nagpur; Calcutta).

Type in the collection of the Indian Museum, Calcutta.

a. ♀ ad., al.	Malabar coast, India.	Purchased.
b. ad. sk.	Nusserabad, India.	St. George Mivart, Esq. [P.].
c. ad. sk.		M. Parzudaki [C.].
d. ad. sk.		Purchased.

5. Nyctinomus plicatus.

Vespertilio plicatus, *Buchanan-Hamilton, Trans. Linn. Soc.* v. p. 261, fig. (1800).
Nyctinomus bengalensis, *Geoffroy, Descr. de l'Egypte*, ii. p. 130 (1812).
Nyctinomus tenuis *et* dilatatus, *Horsfield, Zoolog. Research. in Java* (1825); *Cantor, J. A. S. B.* xv. p. 179.
Dysopes murinus, *Gray, Illustr. Ind. Zool.* (figured), 1830.
Dysopes plicatus, *Temminck, Monogr. Mammal.* i. p. 223 (1835–41).
Dysopes tenuis, *Temminck, l. c.* p. 228.
Nyctinomus plicatus, *Jerdon, Mammals of India*, p. 33 (1867); *Dobson, J. A. S. B.* 1874, p. 143; *Monogr. Asiat. Chiropt.* p. 182 (1876); *P. Z. S.* 1876, p. 721.

About the same size as *N. ægyptiacus*, but the ears are united by a low band in front, which forms an obtuse, slightly elevated, angular projection on the muzzle, and the tragus is very small, quadrate, the superior margin slightly concave, the outer margin with a small projection at the base; margin of the ear-conch evenly and broadly rounded off above; antitragus half-oval, separated posteriorly by a deep notch. Upper lip very thick, deeply grooved by vertical wrinkles. No gular sac in male or female.

Wing-membrane from the lower end of the tibia.

Fur very dense and soft; above bluish black or smoke-black, beneath somewhat paler.

First upper premolar small, in the space between the canine and second premolar.

Length (of an adult ♂), head and body 2″·9, tail 1″·7, tail free from membrane 1″·1, head 1″, ear 0″·9, tragus 0″·1 × 0″·03, forearm 1″·95, third finger 3″·9, fifth finger 1″·7, tibia 0″·7, foot 0″·35.

Hab. Peninsula of India (Calcutta; Ludiana; Agra; Madras); Sumatra; Java; Borneo; Malay Peninsula (Singapore); Philippine Islands.

a. ♂ ad., al. (type).	India.	Dr. Buchanan-Hamilton.
b. ♀ ad., al.	India.	
c. ad. sk.	India.	T. C. Jerdon, Esq. [P.].
d, e. ♂ & ♀ ad., al.	Java.	Mr. Brandt [C.].
f–h. ad. sks.	Java.	E. India Company [P.].
i–k. ad. sks.	Java.	Purchased.
l. ad. sk.	Java.	Purchased.
m. ad. sk.	Malay Peninsula.	
n. ad. sk.	Singapore.	Purchased.
o. ♀ imm. ad., al.	Philippine Islands.	Mr. Cuming [C.].
p. ♂ ad., al.		Sir A. Smith [P.].
q. ♂ ad., al.		M. Lidth de Jeude [C.].
r. ♂ ad., al.		Purchased.
s, t. ♀ ad., al.		

u. ♂ ad., al.	India.	General Hardwicke [C.].
v. skull.		
w, *x*. skeletons.		Purchased.

6. Nyctinomus bivittatus.

Nyctinomous bivittatus, *Heuglin*, *Nova Acta Acad. Leop.-Carol. Nat. Cur.* 1861, p. 13; *Dobson*, *P. Z. S.* 1876, p. 722.

Ears conjoined by a low band, very slightly raised above the muzzle; tragus very small, quadrate; upper lip grooved by vertical wrinkles. No gular sac in male or female. Base of the thumb with a remarkably large circular callous pad. Wings from the middle of the tibiæ. Fur above umber-brown, the extremities of the hairs conspicuously tipped with grey, especially on the top of the head, where either side is streaked with grey, and on the shoulders and middle of the back spotted over with the same colour; beneath similar, but paler. Distribution of the fur and dentition as in *N. plicatus*.

Length (of the type specimen, an adult ♂), head and body 2″·7, tail 1″·6, tail free from membrane 1″·15, head 1″, ear 0″·8, tragus 0″·1, forearm 1″·9, thumb 0″·35, third finger 3″·8, fifth finger 1″·8, tibia 0″·6, foot 0″·4.

Hab. N.E. Africa (Bogos Land).

Type in the collection of the Stuttgart Museum*.

This species is very closely allied to *N. plicatus*, of which it may be considered the African representative.

7. Nyctinomus brachypterus.

Dysopes brachypterus, *Peters*, *Reise nach Mossambique*, *Säugeth.* p. 59, pl. xv. fig. 1 (1852); *Wagner*, *Suppl. Schreb. Säugeth.* v p. 704 (1855).

Nyctinomus brachypterus, *Dobson*, *P. Z. S.* 1876, p. 722.

Ears much shorter than the head, conjoined by a deep band on the muzzle as far forward as a point corresponding to the position of the upper incisors beneath; outer and inner margins continuous, evenly convex above, the inner margin with three minute horny points; antitragus well developed, separated by a deep notch, quadrangular, with shortly rounded angles, the length of its base but slightly exceeding the depth of its anterior margin; tragus small, quadrate, its superior margin directed upwards and inwards, a small projection at the base of its outer margin; keel of the ear-conch large, thickened, expanded, and flattened externally in its lower third; extremity of the nose projecting very much, the distance from the anterior margin of the nostril to the margin of the upper lip exceeding the diameter of the base of the antitragus; upper lip with vertical wrinkles (Plate XXII. fig. 3).

Wings from the middle of the tibiæ. No gular sac in male or female.

* The writer desires to express again his obligations to Dr. Krauss for the opportunity afforded him of examining the type of this species.

Fur very short above and beneath; dark brown above, the base of the hairs whitish; beneath dirty yellowish white, the sides of the body brown.

The first upper premolar stands in the tooth-row and fills up the narrow space between the canine and second premolar; lower incisors very small, not occupying all the space in front of the canines.

Length (of an adult ♀ specimen), head and body 2″·25, tail 1″·25, tail free from membrane 0″·8, head 0″·9, ear 0″·7, tragus 0″·1 × 0″·03, forearm 1″·35, thumb 0″·3; third finger—metacarp. 1″·35, 1st ph. 0″·55, 2nd ph. 0″·7; fourth finger—metacarp. 1″·3, 1st ph. 0″·45, 2nd ph. 0″·35; fifth finger—metacarp. 0″·8, 1st ph. 0″·35, 2nd ph. 0″·15; tibia 0″·45, foot 0″·3.

Hab. Africa (Sierra Leone; Mozambique).

Type in the collection of the Berlin Museum.

a, *b*. ♀ ad., al.	Sierra Leone.	Zool. Soc. Coll.
c. ad. sk.	Sierra Leone.	J. Brown, Esq. [P.].

8. **Nyctinomus pumilus.**

Dysopes pumilus, *Cretzsch. Rüppell, Atlas Reise nördl. Afrika, Zoolog.* p. 69, pl. xxvii. (1826); *Temminck, Monogr. Mamm.* ii. p. 354 (1835–41); *Wagner, Suppl. Schreb. Säugeth.* i. p. 470 (1844), v. p. 704 (1855).

Nyctinomus pumilus, *Dobson, P. Z. S.* 1876, p. 723.

Ears shorter than the head, united upon the muzzle (as in the preceding species), but by a deeper band; outer and inner margins of the ear-conch continuous, evenly rounded above, the inner margin with three minute horny points; antitragus half-oval, arising abruptly from a point behind and on the same level with the angle of the mouth, directly below the posterior commissure of the eyelids, separated posteriorly by a narrow moderately deep notch; tragus small, quadrate, superior margin straight, parallel to the base of the tragus; keel of the ear-conch small, straight, not expanded in lower third; extremity of the muzzle not projecting as much as in the preceding species, the distance from the anterior margin of the nostril to the margin of the upper lip not exceeding the length of the base of the antitragus; upper lip very expansible, with deep vertical wrinkles. No gular sac in male or female.

Wings from the distal third of the tibia.

Fur rather short, but longer than in the preceding species; above, whitish at the base, then dark brown to the tips of the hairs; beneath, less white at the base of the hairs, but slightly greyish at the tips.

Distribution of the fur upon the wing-membrane as in *N. cestonii*; a narrow band of short hairs behind the anterior two thirds of the forearm on the upper surface.

In the male a thick tuft of long hairs arises from the back of the deep band connecting the ears; in the female this hair is not longer than on the adjoining inner sides of the backs of the ears.

Lower incisors very small, crowded; first upper premolar minute, with an acute cusp, in the centre of the space between the canine and second premolar.

Length (of an adult ♂), head and body 2″·1, tail 1″·25, tail free from membrane 0″·75, head 0″·8, ear 0″·65, tragus 0″·1 × 0″·03, forearm 1″·5, thumb 0″·3; third finger—metacarp. 1″·4, 1st ph. 0″·6, 2nd ph. 0″·7; fourth finger—metacarp. 1″·35, 1st ph. 0″·5, 2nd ph. 0″·4; fifth finger—metacarp. 0″·85, 1st ph. 0″·4, 2nd ph. 0″·2; tibia 0″·5, foot 0″·25.

Hab. Africa (Abyssinia; Nubia; Egypt).

a. ad. sk.	North Africa.	
b. ad. sk.	Fernando Po.	Capt. E. Downes, R.N.
c. ♂ ad., al.	Gambia.	Purchased.

The Collection also includes a dried skin and skull of an individual from the Cataract of the Nile, which appears to be intermediate between this species and *N. limbatus*; but it is considerably larger than either, and the colour of the fur and the dentition are slightly different. The form of the muzzle, however, is so much distorted by the removal of the skull that I hesitate to describe it as the type of a new species.

Ears circular, united by a deep band, the upper margin of which is convex, and probably in the recent specimen much larger than in *N. pumilus*; tragus as in that species, but the antitragus has a much broader base and is altogether larger.

Fur very short, both above and beneath; above dark brown, the extreme tips of the hairs slightly greyish; beneath paler, with a broad longitudinal patch of white extending from the middle of the breast, or slightly more forwards, as far back as the pubis; wing-membrane whitish.

Wings from the middle of the tibiæ, or slightly lower down.

The first upper premolar fills up the space between the canine and second premolar; lower incisors 4, not crowded, in a row between the canines.

Length, ear 0″·7, tragus 0″·15 × 0″·1, forearm 1″·65, thumb 0″·3; third finger—metacarp. 1″·6, 1st ph. 0″·7, 2nd ph. 1″; fourth finger—metacarp. 1″·5, 1st ph. 0″·55, 2nd ph. 0″·5; fifth finger—metacarp. 0″·95, 1st ph. 0″·5, 2nd ph. 0″·2; tibia 0″·5, foot 0″·35.

a. ♀ ad. sk.	Cataract of the Nile.	F. Galton, Esq. [P.].
b. skull of *a*.		

9. Nyctinomus limbatus.

Dysopes limbatus, *Peters, Reise nach Mossambique, Säugeth.* i. p. 56 (1852).

Nyctinomus leucogaster, *Grandidier, Rev. et Mag. Zool.* 1869, p. 337.

Nyctinomus limbatus, *Dobson, P. Z. S.* 1876, p. 724.

Distinguishable from *N. pumilus* only by the different colour of the fur of the ventral surface and of the wing-membrane, and by

the slightly broader tragus. In every other respect it agrees so perfectly in structure and measurements with that species that I can scarcely consider it specifically distinct.

Fur above dark brown, also the shoulders, throat, and upper part of the breast; the remaining parts of the ventral surface pale yellowish white, and the wing-, antebrachial, and inferior surface of the interfemoral membrane of the same colour. In immature individuals the white colour of the ventral surface is not so much extended, but appears as a more or less broad patch on the abdomen, increasing in extent according to age.

Hab. Africa, south of the equator (Zanzibar, Mozambique, Angola); Madagascar.

This appears to be the southern representative of *N. pumilus*.

a. ♂ ad., al.	W. Africa.	Mr. Fraser [C.].
b–e. ♂ & ♀ ad., al.	Angola.	Dr. J. E. Gray [P.].
f. ♀ ad., al.	Dar-es-Salam.	Dr. Kirk [C.].
g. ♀ ad., al.	Zanzibar.	Dr. Peters [C.].
h, *i*. ♂ ad., al.	Zanzibar.	Dr. Kirk [C.].
j. ♀ imm., al.	Zanzibar.	Dr. Kirk [C.].
k. ♂ ad., al.	Zanzibar.	Purchased.
l. ♀ imm., al.	Mozambique.	Dr. Peters [C.].

10. Nyctinomus angolensis.

Nyctinomus angolensis, *Peters*, *Jorn. Scien. Mathem. Phys. e Natur. Lisboa*, No. x. 1870; *Dobson*, *P. Z. S.* 1876, p. 724.

Ears much shorter and more triangular than in any of the species previously described, conjoined on the muzzle by a very deep band, as in *N. pumilus*; the antitragus and keel of the ear-conch as in that species; integuments of the ears thick; tragus very small, quadrate, superior margin directed upwards and outwards; upper lip remarkably thick in front, so that the extremity of the nose does not project much beyond its margin, its sides grooved by vertical furrows (Plate XXII. fig. 4).

No gular sac in male or female.

Thumb long; feet large; wing-membrane from the middle of the tibiæ.

Fur, above and beneath, very short. Above, white at the base, terminal three fourths of the hairs deep reddish brown; beneath yellowish white or pale reddish yellow; the shoulders, sides of the neck, chest, and abdomen reddish brown. On the upper surface the membranes are almost quite naked; beneath, the wing-membrane is covered with very short, fine, pale yellowish-white hairs as far outwards as a line drawn from the middle of the humerus to the knee, and similar short fur appears upon the interfemoral membrane.

The first upper premolar very small, scarcely visible without the aid of a lens, in the outer angle between the closely approximated canine and second premolar; sometimes deciduous. Lower incisors crowded.

Length (of an adult ♀), head and body 2″·9, tail 1″·8, tail free

from membrane 0″·95, head 1″·05, ear 0″·75, tragus 0″·1 × 0″·03, forearm 1″·85, thumb 0″·45; third finger—metacarp. 1″·85, 1st ph. 0″·85, 2nd ph. 1″·25; fourth finger—metacarp. 1″·8, 1st ph. 0″·7, 2nd ph. 0″·65; fifth finger—metacarp. 1″·2, 1st ph. 0″·55, 2nd ph. 0″·22; tibia 0″·65, foot 0″·4.

Hab. Africa, south of the equator (Angola; Quenza River); Madagascar (Mahanora).

a. ♀ ad., al.	Quenza River, S.W. Africa.	Purchased.
b, *c*. ♂ ad., al.	Mahanora, Madagascar.	Purchased.

11. Nyctinomus miarensis.

Nyctinomus miarensis, *Grandidier*, *Rev. et Mag. Zool.* 1869, p. 337; *Dobson*, *P. Z. S.* 1876, p. 725.
Nyctinomus unicolor, *Grandidier*, *l. c.* 1870, p. 49*.

About the same size as *N. cestonii*. Ears shorter than the head, united on the muzzle by a band about 0″·15 high in the centre, at a distance of 0″·2 behind the extremity of the nose; ear-conch broadly rounded off above, the outer and inner margins continuous; antitragus longer than high, irregularly quadrate, the shortest side above, separated by a deep notch posteriorly; tragus narrow, much longer than broad, shortly rounded off above, inner margin slightly concave, outer straight, in general shape altogether different from that of any of the previously described species; keel of the ear-conch well developed, prominent, thickened and expanded in lower third. Upper lip very expansible, deeply grooved by vertical wrinkles. No gular sac in male or female.

Thumb short, with a large circular callosity. Wings from the lower end of the tibiæ.

Fur, above, dark brown; beneath, brown with slightly ashy extremities.

Lower incisors 4, the middle incisors overlapping the outer ones; first small upper premolar crushed in between the canine and second premolar, and rather to the outer side.

Length (of an adult ♀ specimen, the type), head and body 3″·5, tail 1″·65, tail free from membrane 1″, head 1″·3, ear 1″, tragus 0″·15 × 0″·4, forearm 2″·4, thumb 0″·35; third finger—metacarp. 2″·4, 1st ph. 1″·05, 2nd ph. 1″·4; fourth finger—metacarp. 2″·25,

* The identity of *N. unicolor* with *N. miarensis* has been confirmed by M. Grandidier, who, in reply to a communication from Dr. Günther (kindly made at my request), states that this species was described by him under two names in consequence of a mistake made by the editor of the 'Revue et Mag. Zoologie.' The original description of *N. miarensis* was taken by M. Grandidier from a much injured specimen, and the MS. was sent from Madagascar to the editor at Paris. Soon afterwards, having obtained another specimen in good condition, he wrote out a second description, changing the manuscript name to *N. unicolor* as being more suitable, and forwarded it to the editor with a request that if his previous communication had not been published, the MS. might be destroyed and the second description be printed instead. When his second letter arrived the contents of the first had been published, but the editor, not quite understanding what he wished to be done, published the second description also.

1st ph. 0″·85, 2nd ph. 0″·6; fifth finger—metacarp. 1″·35, 1st ph. 0″·75, 2nd ph. 0″·3; tibia 0″·7, foot 0″·5.

Hab. Madagascar.

Type in the collection of the Paris Museum.

This species may be at once distinguished from all the known species of the genus by its peculiarly shaped tragus, which is much longer than broad and narrowly rounded off above.

12. Nyctinomus mops.

Dysopes mops, *F. Cuvier, Dents des Mammif.* p. 49 (1825).
Mops indicus, *Lesson, Tabl. du Règne Anim. Mamm.* p. 18 (1842); *Peters, MB. Akad. Berl.* 1869, p. 402.
Nyctinomus mops, *Dobson, Monogr. Asiat. Chiroptera*, p. 182 (1876); *P. Z. S.* 1876, p. 726.

Ears larger than in *N. angolensis*; upper three fourths of the margin of the ear-conch regularly convex, forming almost an arc of a circle; inner margins conjoined by a deep band 0″·2 high in the centre; tragus very small, quadrate; antitragus large, quadrilateral, with rounded angles, nearly as high as long, separated posteriorly by a deep notch, ending abruptly anteriorly close to the angle of the mouth. Upper lip with deep vertical wrinkles. No gular sac in male or female.

Thumb rather long, armed with a well-developed claw; wings from the lower third of the tibia.

Fur very short above and beneath; on the dorsal surface dark brown, somewhat paler beneath, extending upon the wing-membrane along the sides of the body only.

Upper incisors short, separated by a small interval in front; lower incisors 4, crowded; first upper premolar very small, deciduous, in the outer angle between the closely approximated canine and second premolar.

Length (of the type specimen), head and body 3″, tail 1″·5, tail free from membrane 0″·95, ear 0″·95, tragus 0″·1, forearm 1″·8, thumb 0″·4, third finger 3″·5, fifth finger 1″·8, tibia 0″·7, foot 0″·45.

Hab. Sumatra.

Type in the collection of the Paris Museum.

This species is closely allied to *N. angolensis*, agreeing with it in the position of the minute first upper premolar, which is quite external to the tooth-row, in the remarkable length of the thumb as compared with other species of this genus (except *N. johorensis*), and in the peculiar shortness of the fur. It is, however, readily distinguished by the form and size of the ears, and by other characters described above.

a. ♀ ad., al. M. Lidth de Jeude [C.].

The next species is distinguished from all the known species of the genus by the very peculiar manner in which the ears are united, and on this account was made by me the type of a subgenus, *Chærephon* (Journal Asiat. Soc. Beng. 1873, p. 144).

13. Nyctinomus johorensis.

Molossus (Nyctinomus) johorensis, *Dobson, Proc. Asiat. Soc. Beng.* Jan. 1873.

Nyctinomus johorensis, *Dobson, Monogr. Asiat. Chiropt.* p. 183, fig. *a* (head) (1876); *P. Z. S.* 1876, p. 726.

Ears as in *N. plicatus*; but their inner margins are connected by a band of integument which extends forwards on the muzzle as far as a point placed midway between a line joining the eyes and the extremity of the muzzle; this connecting band is continued upwards and backwards between the ears to a height of 0″·4, forming an incomplete funnel open behind, wide below, and narrow above. At a distance of about 0″·3 from the anterior connecting band the ears are again connected by a second fold of integument posterior and parallel to the first, about 0″·1 in vertical height. Between these two connecting folds of integument and the sides of the ears a hollow square is contained. This concavity is empty, and open only from above. At the base of the funnel-shaped anterior boundary a few long hairs exist, as in *N. pumilus*. Margin of the ear-conch evenly convex above; antitragus large, separated by a deep notch; tragus very small, quadrate, superior margin slightly concave.

The animals of this genus possess the power of folding the ear-conch forwards, downwards, and outwards, thus closing the external ear. In this species, therefore, when the ears are closed, the superior part of the funnel-shaped connecting band is drawn forwards, disclosing the cavity behind. In the erect condition of the ears the same funnel-shaped process is drawn backwards across this square hollow cavity, which it covers, as the pitcher of *Nepenthes* is covered by the leaf forming its lid. In this position the extremity of the funnel is flattened out, and lies in the space contained between the posterior connecting band and the top of the head.

The thumb is comparatively longer than in any other species of the genus, and the wing-membrane is attached a short distance below the knee-joint.

Upper incisors separated by a very narrow interval in front; lower incisors 4.

Length, head and body 2″·8, tail 1″·7, tail free from membrane 1″, ear 0″·9, tragus 0″·1, forearm 1″·9, thumb 0″·5, third finger 3″·6, fifth finger 1″·8, tibia 0″·7, foot 0″·4.

Hab. Malay Peninsula (Johore).

This most remarkable species is as yet represented by a single adult male specimen, preserved in alcohol, in the collection of the Indian Museum, Calcutta. It was submitted to the writer's examination by Mr. J. Wood-Mason, who found it among a collection of other objects of natural history sent to him by his private collector from Johore, in the Malay Peninsula.

14. Nyctinomus australis.

Molossus australis, *Gray, Mag. Zool. & Bot.* ii. p. 501 (1838).
Nyctinomus australis, *Dobson, P. Z. S.* 1876, p. 728.

Ears large, but shorter than the head, their inner margins arising close together on the muzzle from distinct points of origin, as in *N. africanus*; integument forming the ear-conch rather thin; keel very deep in lower third, but short and exceedingly thin, bent upwards and backwards; margin of the conch straight or slightly concave in superior third; antitragus very large, triangular, as high as long, posterior margin straight, anterior slightly convex, narrowly rounded off above (Plate XXII. fig. 9): tragus short and broad, as in *N. ægyptiacus*, but its outer margin is distinctly concave about the middle, and there is an obtuse projection at its base. Upper lip with short vertical wrinkles.

The mouth of a *very large gular sac, much larger than in any other known species* of this genus, extends across the throat from a point on either side near the anterior termination of the antitragus, opening forwards, as in *Taphozous* (Plate XXII. fig. 9); in the adult male a dense brush of thickened unctuous hairs, equal in length, projects from the mouth of the sac; in the female the margin of the mouth of the sac is alone developed, and no hairs project outwards.

Wing-membrane from the distal third of the tibia. Fur moderately long and dense, extending upon the dorsal surface of the wing-membrane as far as a line drawn from the middle of the humerus to the distal third of the femur, and a narrow band of short hairs extends outwards behind the forearm, becoming wider in the angle between the forearm and the fifth metacarpal bone, along which it extends for half its length, and, passing over it, covers the space between it and the upper third of the fourth metacarpal; the interfemoral membrane is clothed as far as a line drawn between the knees; beneath, the wing-membrane is densely covered as far as a line drawn from the middle of the humerus to the knee, the fur ending abruptly, the remaining parts of the membranes beneath almost quite naked.

Above, dark reddish brown, beneath paler. In the adult male, the fur covering the wing-membrane beneath, between the humerus and femur from the sides of the body outwards, is *pure white*, contrasting strongly with the dark brown fur of the body; in the female the fur of the body is darker than in the male, and the white fur on the wing-membrane, along the sides of the body beneath, is largely mixed with brown.

Upper incisors rather long, separated by a narrow space in the middle; lower incisors 4, bifid; first upper premolar minute, in the space between the canine and second premolar, drawn slightly inwards.

Length (of an adult ♂ specimen, the type), head and body 3″, tail 1″·9, tail free from membrane 1″, head 1″·15, ear 0″·9, tragus

0″·2 × 0″·15, forearm 2″·35, thumb 0″·35; third finger—metacarp. 2″·25, 1st ph. 0″·9, 2nd ph. 1″·2; fourth finger—metacarp. 2″·1, 1st ph. 0″·7, 2nd ph. 0″·55; fifth finger—metacarp. 1″·2, 1st ph. 0″·7, 2nd ph. 0″·25; tibia 0″·75, foot 0″·5.

Hab. Australia; New Guinea.

This very remarkable species is at once distinguished by the great size and peculiar form of the gular sac, which rather resembles that of the species of the genus *Taphozous*; it also differs from all other species of *Molossi* in the large size and peculiar shape of the antitragus. In the dried skins of adult males the peculiar whiteness of the fur covering the wing-membrane along the sides of the body beneath is very striking, and contrasts remarkably with that of the females, which, for the greater part, does not differ in colour from the fur covering the sides of the abdomen. This additional secondary sexual character is particularly noticeable, as differences between the males and females of insectivorous Bats, depending on peculiarity of the colour of certain parts of their fur, is very rare.

The natural position of this species with reference to the other species of the genus is doubtful, as it differs so remarkably from them all. From the great development of the gular sac it appears to approach *Cheiromeles*, while it resembles the species of *Molossus* with circular antitragus in the distribution of the fur on the wing-membrane, and in the presence of a well-developed gular sac.

a. ♂ ♀ ad., al. (type).	New Guinea.	Mrs. Stanley [P.].
b. ♂ ad. sk.	Gippsland.	Purchased.
c. ♀ ad. sk.		St. George Mivart, Esq. [P.].
d. ad. sk.		Purchased.

15. Nyctinomus megalotis.

Nyctinomus megalotis, *Dobson*, *P. Z. S.* 1876, p. 728.

Ears nearly as long as the head, projecting when laid forwards nearly one fifth of an inch beyond the end of the muzzle; inner margins united on the muzzle by a low band at a distance from the end of the nose equal to the length of the base of the antitragus; inner and outer margins of the ear-conch evenly convex above; ear-keel very deep and slender in lower third, where it is partly folded upwards and backwards, so as to present a flat surface externally; superior and inner margin of the conch with four minute horny projections; antitragus rather small, but separated posteriorly by a deep notch, convex, about once and a half as long as high (Plate XXII. fig. 5): tragus quadrate, with a straight superior margin and projecting outer angle; inner margin straight, outer slightly concave. Extremity of the muzzle very obliquely truncate. Upper lip very expansible, with a few deep vertical grooves. No gular sac.

Thumbs and feet small. Wings from the lower end of the tibiæ.

Fur dark brown, above and beneath, with slightly greyish extremities; the base of the hairs whitish. The face is nearly naked, a

few hairs form a fringe along the anterior margin of the upper lip beneath the nostrils. With the exception of a narrow band of very short fine hairs, which extends on the upper surface of the wing-membrane behind the forearm to the carpus, the membranes external to the humerus appear to be quite naked; along the sides of the body the fur extends as far outwards, above and beneath, as a line drawn from the middle of the humerus to the knee.

Upper incisors separated by a space in front; lower incisors four, bifid, crowded; internal basal cusp of canine small; first upper premolar small, conical, acutely pointed, in the centre of the rather wide space between the canine and second premolar; second upper premolar with an acute internal basal cusp; first lower premolar not crowded, as broad at the base as the second, which exceeds it (as in all other species of the genus) in vertical extent.

Length (of an adult ♂, the type), head and body 3″, tail 2″·1, tail free from membrane 1″·1, head 1″·15, ear 1″, tragus 0″·15 × 0″·1, forearm 2″·35, thumb 0″·35; third finger—metacarp. 2″·25, 1st ph. 0″·95, 2nd ph. 1″·1; fourth finger—metacarp. 2″·1, 1st ph. 0″·8, 2nd ph. 0″·1; fifth finger—metacarp. 1″·1, 1st ph. 0″·75, 2nd ph. 0″·2; tibia 0″·7, foot 0″·45.

Hab. Surinam.

a. ♂ ad., al. (type). Surinam.

16. Nyctinomus macrotis.

Nyctinomus macrotis, *Gray, Ann. Nat. Hist.* iv. p. 5 (1839); *Dobson, P. Z. S.* 1876, p. 729, fig. 6.

Dysopes auritus, *Natt., Wagner, Wiegm. Archiv*, 1843, p. 368; *Burmeister, Thiere Brasiliens*, p. 69 (1854).

Dysopes laticaudatus *et* cæcus, *Rengger, Säugeth. Paraguay*, p. 88.

? Dysopes aurispinosis, *Peale, United States Explor. Exped.* viii. p. 21 (1844).

Nyctinomus auritus, *Peters, MB. Akad. Berl.* 1865, p. 573.

Ears large, nearly as long as the head, conjoined to a height of 0″·2 inch, the inner margins very convex, and consequently close together for more than half their length above the band uniting their bases; integument forming the ear-conch very thin, translucent; keel very deep, projecting outwards beyond the antitragus, but also very slender, curved backwards and upwards; tragus small, quadrate, superior margin straight or very slightly concave, upper half of outer margin concave, lower half forming a prominent angular projection; antitragus considerably longer than high, terminating in front between the eye and the angle of the mouth, separated posteriorly by a deep notch (Plate XXII. fig. 6). Face deeply grooved horizontally beneath the eye, which is remarkably prominent and directed forwards. Muzzle slender, concave between the ears and the projecting sharply cut superior margins of the nostrils; nasal apertures directed almost laterally, separated by a wide space, which is divided in the middle by a raised vertical ridge. Upper lip deeply furrowed by oblique wrinkles. No gular sac.

Thumb rather short, with a small callosity; terminal phalanx of third finger very short. Wings from the distal third of the tibiæ.

Fur short, reddish brown above and beneath; on the upper surface extending upon the wing-membrane as far outwards as a line drawn from the middle of the humerus to the knee-joint, on the base of the interfemoral, and outwards behind the forearm in a narrow band to the carpus.

Teeth slender, with very acute cusps. Lower incisors four, crowded, bifid. First upper premolar small, but acutely pointed, in the centre of the space between the canine and second premolar; second premolar large, with a long and very acute internal basal cusp.

Length (of the type specimen, an adult ♀), head and body 2″·8, tail 1″·9, tail free from membrane 1″, head 1″·1, ear 1″, tragus 0″·15 × 0″·1, forearm 2″·2, thumb 0″·3; third finger—metacarp. 2″·1, 1st ph. 0″·9, 2nd ph. 1″; fourth finger—metacarp. 2″, 1st ph. 0″·75, 2nd ph. 0″·1; fifth finger—metacarp. 1″, 1st ph. 0″·7, 2nd ph. 0″·3; tibia 0″·65, foot 0″·4.

Hab. Cuba; Brazil (Mato Grosso); Paraguay.

a. ♀ ad., al. (type). Cuba. W. S. MacLeay [P.].

The next species, *N. gracilis*, resembles *N. macrotis* very closely in general structure, and forms with it a separate section of the genus, distinguished by the peculiar shape of the muzzle.

17. Nyctinomus gracilis.

Dysopes gracilis, *Natt., Wagner, Wiegm. Archiv*, 1843, p. 368; *Suppl. Schreb. Säugeth.* v. p. 708 (1855).

Nyctinomus gracilis, *Peters, MB. Akad. Berl.* 1865, p. 573; *Dobson, P. Z. S.* 1876, p. 731.

Ears conjoined by the bases of their inner margins only; general form of the ear-conch quite similar to that of *N. macrotis*, but the antitragus is higher than long, separated posteriorly by a very deep notch, and terminating abruptly in front near the angle of the mouth (Plate XXII. fig. 7); tragus very small, quadrate, outer margin concave. Muzzle and remaining parts of the body as in *N. macrotis*. No gular sac.

Fur short, dark brown above and beneath, extending upon the wing-membranes along the sides of the body only.

Length (of an adult ♂ specimen), head and body 2″·5, tail 1″·5, tail free from membrane 0″·7, head 0″·9, ear 0″·75, tragus 0″·1 × 0″·08, forearm 1″·8, thumb 0″·3; third finger—metacarp. 1″·7, 1st ph. 0″·75, 2nd ph. 0″·9; fourth finger—metacarp. 1″·65, 1st ph. 0″·65, 2nd ph. 0″·1; fifth finger—metacarp. 1″, 1st ph. 0″·5, 2nd ph. 0″·15; tibia 0″·5, foot 0″·35.

Hab. Brazil (Mato Grosso); Ecuador; Central America (Guatemala, Panama).

Although much smaller, and with comparatively shorter ears, this species resembles *N. macrotis* so closely in its general structure that,

at first sight, it appears to be a small variety of that species. On closer examination, however, it is easily distinguished by the very different form of the antitragus, and by the short connexion of the ears in front.

a. ♂ ad., al.	San Geronimo.	Purchased.
b. ♀ ad., al.	Ecuador.	Mr. Fraser [C.].
c, *d*. ♂ ad., al.	Dueñas, Guatemala.	O. Salvin, Esq. [C.].

18. **Nyctinomus brasiliensis.**

Nyctinomus brasiliensis, *Is. Geoffroy*, *Ann. des Sci. Nat.* i. p. 337 (1824); *Gervais*, *Expéd. du Comte de Castelnau*, *Zoologie*, p. 60, pl. xii. figs. 2 & 2 *a* (teeth) (1855); *Peters*, *MB. Akad. Berl.* 1865, p. 573; *Dobson*, *P. Z. S.* 1876, p. 731.
Dysopes nasutus, *Temminck*, *Monogr. Mammal.* i. p. 234 (1827).
Nycticejus cynocephala, *Le Conte*, *Cuv. Anim. Kingdom*, p. 431 (McMurtrie ed.) (1831).
Nyctinomus murinus, *Gray*, *Mag. Zool. & Bot.* ii. p. 501 (1838).
Nyctinomus multispinosus (*Peale*), *Burmeister* (vide *Peters*, *l. c.* 1865, p. 573).
Molossus cynocephalus *et* fuliginosus, *Cooper*, *Ann. New-York Lyc.* iv. 1837, pp. 65, 67.
Rhinopoma carolinense, *Gundlach*, *nec Geoffroy*, *Wiegm. Archiv*, 1840, p. 358.
Dysopes naso, *Wagner*, *Suppl. Schreb. Säugeth.* i. p. 475 (1844).
Nyctinomus mexicanus, *Saussure*, *Rev. et Mag. Zool.* 1860, p. 283.
Molossus aztecus, *Saussure*, *l. c.* p. 285.
Nyctinomus nasutus, *Tomes*, *P. Z. S.* 1861, p. 68; *Allen*, *Monograph of the Bats of N. America*, p. 7, figs. 6, 7 (1864).
Nyctinomus musculus, *Gundlach*, *MB. Akad. Berl.* 1861, p. 149.

Ears nearly as long as the head, laid forwards they extend almost to the end of the nose; inner margins not united, but arising close together from the muzzle about midway between a line drawn between the eyes and the extremity of the nose; inner and outer margins of the ear-conch almost regularly convex, continuous; the inner margin with five or six minute horny projections; antitragus but slightly developed, separated posteriorly by a shallow and small notch; tragus quadrate, larger than in *N. gracilis* (Plate XXII. fig. 8). Upper lip with numerous vertical wrinkles; muzzle flat above, terminated by the sharply cut margins of the nostrils. No gular sac in male or female.

Wings from the distal third of the tibiæ near the ankles.

Fur moderately long and very dense, extending upon the wings, above and beneath, as far outwards as a line drawn from the middle of the humerus to the knee, the remainder naked.

Lower incisors six, crowded, the outer incisors very slender, overlapping the external margins of the middle incisors, the internal margins of which are also overlapped by the central incisors; first upper premolar small, with an acute cusp well elevated above the gum in the centre of the small space between the canine and second premolar.

Length (of an adult ♀), head and body 2″·25, tail 1″·4, tail free

Hab. Australia (N.S. Wales; Queensland); Norfolk Island.

a. ad. sk. (type).	Norfolk Island.	
b. ♀ ad., al.	New South Wales.	Mr. Krefft [C.].

Inc. $\frac{2}{3}$ *pm.* $\frac{1-1}{2-2}$. *Ears separate, tragus triangular.*
(Subgenus MORMOPTERUS, Peters.)

20. Nyctinomus albiventer.

Nyctinomus albiventer, *Dobson, P. Z. S.* 1876, p. 733.

Ears triangular, shorter than the head, inner margins arising from distinct points of origin from the forehead; inner margin of the ear-conch almost straight, slightly concave in upper third, tip rounded off, outer margin straight; antitragus scarcely defined, separated posteriorly by a very shallow notch (Plate XXI. fig. 4); tragus nearly as broad opposite the base of its inner margin as high, irregularly triangular, rounded off above, very similar in shape to that of *N. norfolcensis*, but less triangular and broader above, an obtuse projection about the middle of its outer margin. Extremity of the muzzle projecting very much beyond the mandible, the end of the nose very prominent and distinct from the upper lip; nostrils opening almost laterally. Sides of the upper lip with vertical grooves not well defined. Gular sac small.

Wings from the lower third of the tibiæ or from the ankles; fifth toe somewhat smaller than the first.

Dentition similar to that of *N. acetabulosus* (vide *infrà*, p. 441), but the lower incisors are not crowded.

Fur, above, white at the base, the remaining part dark brown; beneath, the greater part of the chest and abdomen dirty white, the sides brown. Wing- and interfemoral membranes nearly naked; a narrow band of fur extends outwards behind the forearm and along the proximal third of the fifth metacarpal bone.

Length (of an adult ♀, the type), head and body 2″·2, tail 1″·25, tail free from membrane 0″·7, head 0″·85, ear 0″·65, tragus 0″·15, forearm 1″·45, thumb 0″·35; third finger—metacarp. 1″·4, 1st ph. 0″·55, 2nd ph. 0″·7; fourth finger—metacarp. 1″·4, 1st ph. 0″·5, 2nd ph. 0″·35; fifth finger—metacarp. 0″·9, 1st ph. 0″·35, 2nd ph. 0″·15; tibia 0″·4, foot 0″·3.

Hab. Madagascar.

a. ♀ ad., al. (type).	Madagascar.	Purchased.

21. Nyctinomus acetabulosus.

Molossus acetabulosus, *Commerson, MS.* (vide *Peters, MB. Akad. Berl.* 1869, p. 402).

Nyctinomus acetabulosus. *Desmarest, Mammalogie*, p. 117 (1820); *Dobson, P. Z. S.* 1876, p. 734.

Nyctinomus natalensis, *Smith, Illustr. S. Afr. Zoology, Mammalia*, pl. 49.

Nyctinomus (Mormopterus) jugularis, *Peters, P. Z. S.* 1865, p. 468.

Ears quite separate, arising from the sides of the forehead at a short distance above and in front of the eyes; the inner margin of the ear-conch slightly convex for two thirds its length, abruptly *concave* in upper third, so that the upper extremity of the ear is attenuated, and the subacute tip projects forwards and inwards instead of backwards and outwards as in most species of Bats (Plate XXI. fig. 5); outer margin of the conch forming almost a straight line from the tip to its termination near the angle of the mouth, interrupted only by a slight emargination opposite the middle of the tragus indicating the commencement of the antitragus; tragus nearly as broad as high, irregularly triangular, with a truncated vertical angle. Muzzle flat, extremity projecting considerably beyond the lower lip; sides of the upper lip with short ill-defined vertical wrinkles. In males a large glandular sac opens in the centre of the inferior surface of the neck; in females rudimentary.

Wings from the distal third of the tibiæ; the fifth toe not so much thickened as the first.

Fur dark reddish brown above, somewhat paler beneath.

Upper incisors separate from the canines and also from each other; lower incisors small, slender, bifid, crowded; the second incisor on each side slightly overlapped by the margins of the first and third; canines without basal cusps; the single upper premolar separated by a narrow interval from the canine, with a projecting base internally, which is concave behind, and anteriorly develops an acute cusp; first lower premolar unicuspidate, equal to three fourths the second in vertical extent.

Length (of an adult ♂), head and body 1″·9, tail 1″·7, tail free from membrane 0″·6, head 0″·75, ear 0″·6, tragus 0″·15, forearm 1″·55, thumb 0″·25; third finger—metacarp. 1″·5, 1st ph. 0″·6, 2nd ph. 0″·7; fourth finger—metacarp. 1″·5, 1st ph. 0″·5, 2nd ph. 0″·4; fifth finger—metacarp. 1″·15, 1st ph. 0″·4, 2nd ph. 0″·2; tibia 0″·4, foot 0″·35.

Hab. S.E. Africa (Natal); Madagascar; Bourbon; Mauritius.

a, b. ♂ & ♀ ad., al.	Mauritius.	Zool. Soc. Coll.
c. ♂ ad., al.		A. Newton, Esq. [P.].
d. ad. sk.		M. Parzudaki [C.].

The three last-described species, *N. norfolcensis*, *N. albiventer*, and *N. acetabulosus*, differ from all the other species of the genus in the relative lengths of the metacarpal bones of the third and fifth fingers, resembling rather, in this respect, the species of the subgenus *Myopterus* (gen. *Molossus*). In all other species of *Nyctinomus* the metacarpal bone of the third finger is double the length of that of the fifth; in these three species, and in *Myopterus*, it is but one half longer. These species also agree together in the form of the tragus (in which they also differ from all other species of *Nyctinomus* and resemble *Myopterus*), in their distinctly separated ears, in the possession of six lower incisors, and in the

presence of a glandular gular sac. These characters appear sufficient to unite them in a subgenus at least. But *N. norfolcensis* has an additional upper premolar, which is even better developed than in other species of the genus, and therefore belongs to the subgenus *Nyctinomus*; while *N. albiventer* and *N. acetabulosus*, on account of the absence of this small premolar, are relegated to the subgenus *Mormopterus*.

It is therefore impossible, in a natural arrangement of the species, to separate *N. albiventer* and *N. acetabulosus* into a distinct subgenus characterized by the number of the upper premolars, for this would exclude *N. norfolcensis*, which is undoubtedly, in all other respects, very closely allied to them, and forms with them a well-defined section of the genus.

Group MYSTACINÆ.

The characters of the group are indicated under those of the single genus below.

14. MYSTACINA.

Mystacina, *Gray, Voyage of the 'Sulphur,' Mammalia*, p. 23 (1843); *Tomes, P. Z. S.* 1857, p. 138.

Ears separate; the inner margin of the ear-conch arising from the side of the head, the outer margin commencing opposite the inner, not carried forwards on the side of the face; tragus long, attenuated; muzzle obliquely truncated as in *Molossus*; the nasal apertures oblong, vertical.

Middle finger of three phalanges, whereof the first is flexed downwards and forwards upon the metacarpal bone (in repose); legs short, with well-developed tibiæ and fibulæ as in the *Molossi*; outer and inner toes larger than the other toes; tail perforating the interfemoral membrane and appearing upon its upper surface.

Dentition. Inc. $\frac{2}{2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Upper incisors large, in the centre of the space between the canines; upper premolars well developed.

This genus, represented by a single species only, unites some of the characters of the *Vespertilionidæ* to those of the *Emballonuridæ*, and in the latter family connects the subfamily *Emballonurinæ* with the *Molossinæ*.

1. Mystacina tuberculata.

Mystacina tuberculata, *Gray, Voyage of the 'Sulphur,' Mammalia*, p. 23 (1843); *Voy. of the 'Erebus' and 'Terror,'* iv. pl. 22 (1844); *Tomes, P. Z. S.* 1857, p. 138, pl. liv.; *Dobson, P. Z. S.* 1876, p. 486, figs. *a*, *b* (thumb and foot).

Mystacina velutina, *Hutton, Trans. New-Zealand Institute*, iv. p. 185 (1871).

Crown of the head rather abruptly but slightly elevated above the

face-line; muzzle long, conical, terminated by the projecting extremity of the nose, which extends far beyond the lower lip, and is separated from the lateral portion of the upper lip by a groove on either side; nostrils very prominent, with thickened rounded margins terminating the muzzle in front; nasal apertures consisting of narrow vertical slits directed sublaterally with a groove between; mouth small, the upper lip projecting on all sides, as in the *Molossi*, beyond the lower lip, but apparently not so expansible as in that group. Ears oval, obtusely pointed, in general outline very similar to those of *Vespertilio dasycneme*; but the outer margin of the conch is more convex, the inner margin commences directly from the side of the head without forming a lobe (in this respect agreeing with the species of this family), the outer margin terminates similarly: tragus long, attenuated upwards subacutely pointed, and directed slightly inwards and forwards; outer margin slightly convex, inner margin correspondingly concave, a small erect tooth-like projection on the outer side near the base; a ridge passes backwards from the posterior commissure of the eyelids to the base of the inner margin of the tragus.

Thumb long, armed with a large and very acute claw, which has a small talon projecting from its concave surface near the base (see P. Z. S. 1876, p. 487, fig. *a*); the feet have similarly long and very acute claws, and at the base of each a similar talon is placed (*l. c.* fig. *b*). The posterior extremities are short, the legs very short and thick; and the outer and inner toes shorter and thicker than the others, as in other species of the subfamily, but they are not fringed with long hairs.

The feet are remarkably large, and much rotated outwards and forwards so as to allow of easy progression. The structure of the sole of the foot and of the inferior surface of the leg is very peculiar. The plantar surface, including the toes, is covered with soft and very lax integument, deeply wrinkled; and each toe is marked by a central longitudinal groove with short grooves at right angles to it, as in the Reptilian genus *Hemidactylus*. The lax wrinkled integument covering the sole of the foot is continued along the inferior flattened surface of the ankle and leg (*l. c.* fig. *b*).

The antebrachial membrane is scarcely developed, a mere rudiment of it exists in the angle at the elbow.

Wings from the ankles or tarsi; calcanea feeble. The greater part of the wing-membrane is exceedingly thin, but a narrow portion along the forearms, the sides of the body, and the tibiæ is remarkably thick and leathery, with numerous deep wrinkles, and of a yellowish-brown colour, contrasting with the dark hue of the other parts. Similarly the base of the interfemoral, as far as the point where it is perforated by the tail, is thickened and wrinkled. Beneath this thickened portion of the volar membrane the wings are folded, and it is evidently analogous to the thickened portion of the anterior wings in Hemiptera and to the elytra of the Coleoptera.

The folded wing occupies a very small space, and this is due to

the presence of an additional joint in the middle finger, to the thinness of the wing-membrane, and especially to the manner in which the phalanges of the fingers are folded. The first phalanx of the middle finger, instead of being folded (in repose) upon the dorsal surface of the metacarpal bone (as in the other species of this subfamily), is flexed downwards, inwards, and forwards upon the inferior surface of the metacarpal, carrying with it (by traction on the membrane) the corresponding phalanx of the fourth finger, which lies folded downwards and forwards, between it and the metacarpal bone; the second phalanx is folded backwards on the first, and the third phalanx is folded forwards on the second. Being thus reduced by this peculiar folding process into the smallest possible space, the wing is then tucked in beneath the thickened portion of the wing-membrane, and between it and the inferior thin margin of a strong musculo-tendinous band, which extends from the distal fourth of the humerus and from the inferior surface of the rudimentary and thickened antebrachial membrane along the inferior surface of the humerus to the metacarpal bone of the thumb. The posterior half of the interfemoral membrane, from the point where the tail perforates it, is rolled upwards and forwards beneath the leathery anterior half. With the wing- and interfemoral membranes thus encased, this species is the most quadrupedal of Bats.

Fur very peculiar, and quite different from that of any other known species of Bat, so that the quality of the fur is alone characteristic of this very remarkable species. The hairs are moderately long and much thicker than in any other species. Viewed under the microscope the shaft of each of the long hairs appears almost quite smooth, with very slight indication of the margins of the hair-scales so conspicuous in every other species of Chiroptera.

Above, brown, the terminal third of the hairs greyish brown; beneath much paler. The face is thickly covered, and long erect hairs spring from the small glandular prominences behind the nostrils and fringe the lip, but the membranes are nearly naked.

Upper incisors as in *Molossus rufus*, with diverging cusps, lower incisors trifid; first and second upper premolars about half the size of the canine and nearly equal; first lower premolar about three fourths the second in vertical extent, but equal to it in cross section; all the molars acutely tubercular.

Length, head and body 2″·5, tail 0″·7, head 1″·05, ear 0″·7, tragus 0″·4, forearm 1″·75, thumb 0″·4; third finger—metacarp. 1″·55, 1st ph. 0″·45, 2nd ph. 0″·55, 3rd ph. 0″·55; fourth finger—metacarp. 1″·55, 1st ph. 0″·4, 2nd ph. 0″·55; fifth finger—metacarp. 1″·4, 1st ph. 0″·28, 2nd ph. 0″·4 × 0″·3; tibia 0″·65, foot 0″·55.

Hab. New Zealand.

The peculiarities of structure described above must accompany some corresponding peculiarities in the habits of this species. The denticles at the bases of the very sharp claws of the thumbs and feet would undoubtedly greatly assist the animal in making good its hold when climbing; and this, taken into consideration with the peculiar manner in which the wings are protected from injury when not em-

ployed in flying, and with the manifestly adhesive nature of the sole of the foot and inferior surface of the legs, lead me to believe that this species hunts for its insect food, not only in the air, but also on the branches and leaves of trees, among which its peculiarities of structure would, without doubt, enable it to creep about with ease and security.

a. ad. sk. (type).	New Zealand.	
(Figured in the 'Voyage of the Erebus and Terror.')		
b. ad. sk.	New Zealand.	Sir E. Belcher.
c. ad. sk.	New Zealand.	Sir G. Grey [C.].
d. ♀ ad., al.	New Zealand.	Capt. Stokes [P.].
e, *f*. ad. skn., in al.	Wellington, N. Zealand.	Colonial Museum [P.].
g. skeleton (imperfect).		

Family PHYLLOSTOMIDÆ.

Phyllostomata, *Peters*, *MB. Akad. Berl.* 1865, p. 256.
Phyllostomidæ, *Gray*, *Dobson*, *Ann. & Mag. Nat. Hist.* 1875, xvi. p. 347.

Bats with cutaneous processes either surrounding or close to the nasal apertures; with moderately large ears and well-developed tragi; with *three* phalanges in the middle and one in the index finger; and with, generally, well-developed united premaxillary bones.

The teeth vary very considerably in number and form in the different groups into which the family is divisible, ranging from 36 in the genus *Glossonycteris* to 20 in *Desmodus*. The upper middle incisors are generally well developed; the number of true molars extremely variable in some genera.

Antebrachial membrane well developed (except in the *Desmodontes*), extending along the forearm and enclosing the base of the thumb; tibia rather long and straight, fibula slender or rudimentary; tail very variable, in a few genera well developed, in most either very short or rudimentary or altogether absent.

These Bats are readily distinguished by the presence of a third phalanx in the middle finger, associated with either distinct cutaneous nasal appendages or with well-developed central upper incisors, or with both. Unlike the *Rhinolophidæ*, their eyes are generally large and the tragus well developed, maintaining almost the same form throughout the different species, however much the other parts of the body may vary in shape.

Their fur is generally of a dull colour, and the face and back (in the group *Stenodermata* especially) are often marked with white streaks, as in the *Pteropodidæ*, of which they take the place in the Western Hemisphere. A few species, probably all those with the

tail and interfemoral membrane well developed, feed principally on insects, while the greater number of species of the groups *Vampyri* and *Glossophagæ* appear to live on a mixed diet of insects and fruits, and those of the group *Stenodermata* wholly on fruits; the *Desmodontes*, of which two species only are known, are truly sanguivorous, and have their teeth and intestinal tract specially modified in accordance with their habits (see further remarks on habits and internal structure under heads of groups and genera).

From the large development of the antebrachial membrane it may be inferred that the species of this family are unfitted for walking on a horizontal surface; and this is quite in accordance with the observations of those who have noted their habits (see remarks on the habits of *Macrotus waterhousii*), which are therefore, in this respect, in direct contrast with those of the *Molossinæ*. The insectivorous species capture their prey on the wing, while the frugivorous hang suspended from a branch of the tree on the fruit of which they may be feeding, this position allowing free motion to the arms and thumbs, which the animal uses for holding its food to its mouth.

In the *Desmodontes* alone, which cling by their extremities to the body of the animal whose blood they may be sucking, the antebrachial membrane is narrow, and scarcely developed along the forearm.

Range. The Neotropical Region. Apparently limited to the forest-clad districts of the tropical and subtropical parts of this region, and probably not extending much further south than the thirtieth parallel of latitude.

The genera of *Phyllostomidæ* fall naturally into two subfamilies, according as the nostrils open at the extremity or on the upper surface of the muzzle, the species of the first division being all insectivorous, while those of the second subsist generally on a mixed diet. These subfamilies are again divisible into groups of allied genera according to the form of the skull and teeth.

Synopsis of Subfamilies and Groups.

I. Nostrils opening by simple apertures at the extremity of the muzzle in front, not margined by a distinct nose-leaf; chin with expanded leaf-like appendages ..... Subfamily LOBOSTOMINÆ.
Group *MORMOPES*, p. 447.

II. Nostrils opening on the upper surface of the muzzle, the nasal apertures more or less surrounded or margined by well-developed cutaneous appendages, forming a distinct nose-leaf; chin with warts. Subfamily PHYLLOSTOMINÆ.

a. Molars well developed; upper incisors 4.

a'. Muzzle long and narrow; outer side of true molars with W-shaped cusps.

a''. Tongue moderately long, terminating in an obtuse tip; upper surface of the lower lip not divided in the centre by a deep groove ..	Group 1. *VAMPYRI*, p. 458.
b''. Tongue very long, much attenuated towards the tip; upper surface of the lower lip divided by a deep groove in the centre	Group 2. *GLOSSOPHAGÆ*, [p. 497.
b'. Muzzle short, broad, and obtuse; true molars broad and flat, with an outer notched cutting-edge	Group 3. *STENODERMATA*, [p. 511.
b. No true molars, or, if present, with crowns reduced to a narrow cutting-edge; upper incisors 2, large, trenchant	Group 4. *DESMODONTES*, [p. 545.

If we arrange these groups according to their natural affinities, the *Vampyri* should be placed between the *Glossophagæ* and the *Stenodermata*.

Subfam. I. LOBOSTOMINÆ.

Group MORMOPES.

The characters of the single group are those of the subfamily.

Synopsis of Genera.

a. Crown of the head moderately elevated above the face-line, the basicranial axis almost in the same plane as the facial..	1. CHILONYCTERIS, p. 447.
b. Crown of the head greatly elevated above the face-line, the basicranial axis almost at right angles with the facial.....	2. MORMOPS, p. 454.

1. CHILONYCTERIS.

Chilonycteris, *Gray*, *Ann. Nat. Hist.* iv. p. 4 (1839); *Burmeister*, *Thiere Brasiliens*, p. 74 (1854); *Peters*, *MB. Akad. Berl.* 1872, p. 359.
Lobostoma, *Gundlach*, *Wiegm. Archiv*, 1840, p. 356.
Phyllodia, *Gray*, *P. Z. S.* p. 50 (1843).

Crown of the head moderately elevated above the face-line; ears separate, the inner margin of the ear-conch arising from the side of the head; form of the ear very similar in all the species, broad below, attenuated abruptly above, the deep outer margin carried forwards almost to the angle of the mouth; tragus longer than broad, rounded off above, a horizontal projecting lobule at the middle of its inner margin; muzzle moderately long and broad, but not deep, obliquely and sharply truncated in front from before

backwards; the nasal apertures circular, close together, opening on this obliquely directed surface; lower lip much expanded and folded outwards, with numerous small rounded papillæ in front; chin with a horizontal cutaneous expansion.

Wing-membrane from the proximal extremity of the calcaneum and from the tibia; interfemoral membrane large, with long calcanea; tail perforating the membrane, and appearing upon its upper surface.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

The upper middle incisors larger than the outer incisors, with broad notched edges; the lower incisors triangular in cross section, the base outwards; second lower premolar minute, half internal.

Range. Tropical parts of the Neotropical Region.

The species of this genus are insectivorous; the stomachs of individuals examined by Mr. Osburn and by the writer were invariably found to contain remains of insects.

All the species are very closely allied to one another, agreeing together remarkably in the form of the muzzle and of the cutaneous chin appendages, in the peculiarly attenuated ears, in the general structure of the body, and, especially, in dentition. In one species (*Ch. davyi*) the wing-membrane, instead of arising from the sides of the body as in all the other species, is connected to the centre line of the back by a narrow ligament only, and the back of the animal behind the shoulders is naked. On this account this species has been made the type of a genus (*Pteronotus*, Gray); but that genus cannot stand, neither can the character on which it is founded be considered sufficient to warrant the formation of a distinct subgenus, for *Ch. davyi* differs in none other important respect from the other species of the genus, and the variability of the point of attachment of the wing-membrane is quite as well marked in other genera of Chiroptera.

Synopsis of the Species.

I. Wings from the sides of the hairy back.. (Subgen. CHILONYCTERIS.)
  a. Lower third of the inner margin of the ear-conch thickened and separated by a right-angled notch from the upper two thirds.
    a'. A small tooth-like projection from the upper margin of each nostril; outer margin of the ear-conch abruptly convex at the commencement of its lower two thirds, forming an acute-angled notch; forearm 1″·65 ..... 1. *Ch. macleayii*, p. 449.
  b'. No tooth-like projection from the upper margin of each nostril.
    a''. Outer margin of the ear-conch abruptly convex at the commencement of its lower two thirds, forming a right-angled notch; forearm 1″·8 .. 2. *Ch. personata*, p. 451.

b''. Outer margin of the ear-conch gradually convex at the commencement of its lower two thirds; forearm 1″·65 ..... 3. *Ch. psilotis*, p. 451.

b. Lower third of the inner margin of the ear-conch not thickened, continuous with the upper two thirds.

b'. No tooth-like projection from the upper margin of each nostril.

a''. Outer margin of the ear-conch abruptly convex at the commencement of its lower two thirds, forming a right-angled notch.

a'''. Crown of the head more elevated; an obtusely conical projection on the upper surface of the muzzle; forearm 2″·1 ..... 4. *Ch. parnellii*, p. 452.

b'''. Crown of the head less elevated; a small transverse rounded projection on the muzzle; forearm 2″·45 ..... 5. *Ch. rubiginosa*, p. 452

II. Wings from the spine; back behind the shoulders naked ..... (Subgen. PTERONOTUS.)

a. Ears and muzzle as in *Ch. personata*; forearm 1″·85 ..... 6. *Ch. davyi*, p. 453.

1. Chilonycteris macleayi.

Chilonycteris macleayii, *Gray*, *Ann. Nat. Hist.* iv. p. 5, pl. i. fig. 2 (1839); *Wagner*, *Suppl. Schreb. Säugeth.* i. p. 448 (1844), v. p. 678 (1855); *Peters*, *MB. Akad. Berl.* 1872, p. 361.

Lobostoma quadridens, *Gundlach*, *Wiegm. Archiv*, 1840, p. 357.

Chilonycteris fuliginosa, *Gray*, *P. Z. S.* 1843, p. 20.

Chilonycteris grisea, *Gosse*, *Naturalist's Sojourn in Jamaica*, p. 326, pl. vi. fig. 1 (1851).

Chilonycteris quadridens, *Tomes*, *P. Z. S.* 1861, p. 65.

Ears very narrow, attenuated above, and subacutely pointed; inner margin of the ear-conch commencing in a small lobe, then convex and thickened, abruptly flatly emarginate at the junction of its lower and middle thirds; middle third faintly convex, with four or five minute tooth-like processes (as in some species of *Nyctinomus*); upper third straight; outer side deeply and flatly emarginate for half its length beneath the tip, the emargination terminating in an acute-angled notch formed by an abrupt elevation, from which, to the termination of the outer margin in a line beneath the eye near the angle of the mouth, the increased width of the ear-conch is maintained (Plate XXIII. fig. 1 *a*, ear, double natural size): tragus longer than broad, the outer margin slightly slanting upwards and inwards above; about the middle of the inner margin a well-marked horizontal lobe. On the upper surface of the muzzle, about 0″·15 behind the nasal apertures, a small elevation of the integument, almost concealed by the fur, projects slightly; and at

its extremity four well-defined cutaneous tooth-like processes project upwards, one from the sharply cut upper margin of each nostril, and one larger on each side (Plate XXIII. fig. 1). Lower lip much expanded outwards, with a thin free edge broader in front, the surface opposite the canines covered with wart-like papillæ; from the chin an underlying cutaneous expansion is directed horizontally outwards, and almost touches the lower free margin of the lip; the inferior surface of this expansion is marked by three parallel ridges in this and in all other known species (Plate XXIII. fig. 1).

Wings from the inner side of the lower third of the tibiæ and from the calcanea.

Above greyish brown; beneath, much paler, almost white.

Brain-case vaulted, and considerably raised above the face-line, but the cranio-facial axis is almost in the same right line; frontal bones flattened, but not expanded laterally; no postorbital processes; zygomata short and very slender; nasal opening small, directed forwards; premaxillary bones united, but slender; central upper incisors triangular in outline, the apex at the root, the base deeply notched, forming the cutting-edge; outer upper incisors very small, with a broad base and a single oblique acutely pointed cusp directed forwards and inwards; first upper premolar small, with a single acutely pointed vertically directed cusp; second upper premolar equalling the canine in cross section at the base, its acutely pointed cusp slightly exceeding the molars; molars with well-developed W-shaped cusps, the last molar half the antepenultimate molar; lower incisors trifid, equal, each tooth triangular in cross section at the base, the apex of the triangle inwards; first and third lower premolars equal in vertical extent, the cingulum of the first more developed upwards; second lower premolar very small, internal to the tooth-row, not visible from without; the three lower molars nearly equal in size.

Length (of the type, an adult ♂), head and body 1″·75, tail 0″·95, head 0″·65, ear 0″·65, tragus 0″·2, forearm 1″·65, thumb 0″·25; third finger—metacarp. 1″·45, 1st ph. 0″·32, 2nd ph. 0″·5, 3rd ph. 0″·45; fourth finger—metacarp. 1″·3, 1st ph. 0″·33, 2nd ph. 0″·33; fifth finger—metacarp. 1″·15, 1st ph. 0″·35, 2nd ph. 0″·35; tibia 0″·6, foot 0″·33.

Hab. Antillean Subregion (Cuba, Hayti, Jamaica).

This species is easily distinguished from all other known species by the small erect cutaneous processes above the nostrils, and very acute-angled notch terminating the emargination on the outer side of the ear.

a. ♂ ad., al. (type). Cuba. W. S. MacLeay, Esq. [P.].
b, c. ♂ & ♀ ad., al. Cuba. W. S. MacLeay, Esq. [P.].
d. ♂ ad., al. Port au Prince, Hayti. J. N. Tweedy, Esq. [P.].
(Type of *Chilonycteris fuliginosa*, Gray.)
e. ♂ ad., al. Jamaica. P. H. Gosse, Esq. [C.].
(Type of *Chilonycteris grisea*, Gosse.)

2. Chilonycteris personata.

Chilonycteris personata, *Wagner, Wiegm. Archiv*, 1843, p. 367; *id. Suppl. Schreb. Säugeth.* v. p. 680 (1855); *Burmeister, Thiere Brasiliens*, p. 76 (1854); *Peters, MB. Akad. Berl.* 1872, p. 360.

Slightly larger than the preceding species, and distinguished from it by the absence of the small cutaneous projections from the upper margins of the nostrils and by the less abrupt elevation of the outer margin of the ear-conch at the junction of its upper third with its lower two thirds, which forms here a right-angled notch.

According to Wagner and Burmeister, it resembles *Ch. davyi* (see p. 453) in all respects except in the attachment of the wing-membrane and nakedness of the back.

Fur above dark brown, beneath paler, the extremities of the hairs much paler on both surfaces.

Length, head and body 2″·1, tail 0″·7, ear 0″·6, forearm 1″·75.

Hab. Guatemala; Venezuela; Brazil (Mato Grosso).

The type of this species, which I have not yet seen, is preserved in the Vienna Museum, and the above description is taken from Wagner and Burmeister.

3. Chilonycteris psilotis.

Resembles *Ch. macleayi* closely in size, but easily distinguished by the absence of the notch on the outer side of the ear and of the small projections from the upper margins of the nostrils, as well as by the colour of the fur and by the different proportions of the bones of the extremities.

The inner margin of the ear-conch is quite similar to that of *Ch. macleayi*, but, at the termination of the emargination which occupies the upper half of the outer side, and is much shallower than in that species, instead of an abrupt elevation forming an acute-angled notch, the margin becomes very gradually convex, almost straight (Plate XXIII. fig. 2, ear, enlarged).

The small projection on the upper surface of the muzzle, expanded lower lip, and horizontal cutaneous process from the chin as in *Ch. macleayi*, with which it also agrees in dentition.

Fur orange above and beneath, with orange-brown extremities; darker above, paler beneath.

Length, head and body 1″·7, tail 0″·7, head 0″·65, ear 0″·65 × 0″·3, tragus 0″·2, forearm 1″·65, thumb 0″·25; third finger—metacarp. 1″·5, 1st ph. 0″·28, 2nd ph. 0″·5, 3rd ph. 0″·55; fourth finger—metacarp. 1″·3, 1st ph. 0″·3, 2nd ph. 0″·35; fifth finger—metacarp. 1″·15, 1st ph. 0″·38, 2nd ph. 0″·35; tibia 0″·6, foot 0″·4.

Hab. Unknown.

a, b. ♂ & ♀ ad., al. (types).

4. Chilonycteris parnellii.

Phyllodia parnellii, *Gray*, *P. Z. S.* 1843, p. 50.
Chilonycteris boothii, *Gundlach et Peters*, *MB. Akad. Berl.* 1861, p. 154.
Chilonycteris osburnii, *Tomes*, *P. Z. S.* 1861, p. 66, pl. xiii.
Chilonycteris parnellii, *Peters*, *MB. Akad. Berl.* 1866, p. 678.

Considerably larger than any of the preceding species; also differing from all in the form of the inner margin of the ear-conch, which is regularly convex from the base upwards, and the outer margin forms an obtuse-angled notch at the commencement of its lower two thirds, terminating the upper emargination; on the muzzle an obtusely conical elevation; no projection from the upper margin of the nostril nor from the upper lip.

Fur above dark greyish brown, the base of the hairs much paler; beneath, the base of the hairs is dark, and the terminal one fourth ashy. Membranes almost naked above and beneath.

Length (of the type specimen), head and body about 2″·3, ear 0″·75, forearm 2″·1, thumb 0″·25; third finger—metacarp. 1″·8, 1st ph. 0″·35, 2nd ph. 0″·6, 3rd ph. 0″·7; fourth finger—metacarp. 1″·65, 1st ph. 0″·38, 2nd ph. 0″·5; fifth finger—metacarp. 1″·65, 1st ph. 0″·38, 2nd ph. 0″·45; tibia 0″·7, foot 0″·45.

Hab. Cuba; Jamaica (inhabiting caves).

See remarks on the habits of this species by the late Mr. W. Osburn in P. Z. S. 1865, p. 68.

a. ad. sk. (type).	Jamaica.	R. Parnell, M.D. [P.].
b, c. ♂ & ♀ ad. sks.	Jamaica.	W. Osburn, Esq. [P.].

(Types of *Chilonycteris osburnii*, Tomes.)

5. Chilonycteris rubiginosa.

Chilonycteris rubiginosa, *Wagner*, *Wiegm. Archiv*, 1843, p. 369; *Suppl. Schreb. Säugeth.* v. p. 680 (1855).

Conspicuously larger than *Ch. parnellii*, and differing from it and from all the other species in the less elevated crown of the head. The form of the ear is very similar to that of *Ch. parnellii*, the inner margin of the ear-conch is similarly evenly convex from the base upwards, but the emargination on the outer side is deeper, and the convexity terminating it is more abrupt, and the ear is altogether much larger; the cutaneous process on the muzzle behind the nostrils is more transverse and less elevated than in *Ch. parnellii*, and is supported posteriorly by a low ridge placed at right angles to it (Plate XXIII. fig. 3, head, double natural size).

Fur varying in colour from bright reddish to dark brown; beneath, the extremities of the hairs are much paler than their bases.

Inner lower incisors trifid, outer incisors bifid.

Length (of an adult ♂), head and body 2″·65, tail 1″, interfemoral membrane about 1″·5, head 1″, ear 0″·9, tragus 0″·3, forearm 2″·45,

thumb 0″·3; third finger—metacarp. 2″, 1st ph. 0″·4, 2nd ph. 0″·7, 3rd ph. 0″·8; fourth finger—metacarp. 2″, 1st ph. 0″·42, 2nd ph. 0″·6; fifth finger—metacarp. 1″·9, 1st ph. 0″·45, 2nd ph. 0″·6; tibia 0″·8, foot 0″·45.

Hab. Guatemala; Costa Rica; Columbia; Brazil.

This is the largest species of the genus.

a. ad. sk.	Cuidad Vieja, Guatemala.	O. Salvin, Esq. [C.].
b. ♂ ad., al.	Dueñas, Guatemala.	O. Salvin, Esq. [C.].
c. ♀ ad., al.	Columbia.	Purchased.

6. Chilonycteris davyi.

Pteronotus davyi, *Gray, Mag. Zool. & Bot.* ii. p. 500 (1838); *Voyage of the 'Sulphur,' Mammalia*, p. 24 (1844); *Peters, MB.Akad. Berl.* 1872, p. 361.

Chilonycteris gymnonotus, *Wagner, Wiegm. Archiv*, 1843, p. 367; *Abhandl. Münch. Akad.* v. p. 183, pl. iii. fig. 1; *Suppl. Schreb. Säugeth.* v. p. 680 (1855).

Slightly larger than *Ch. macleayi*, but at once distinguished from that and from every other known species by the origin of the wings from the spine and by the nakedness of the back behind the shoulders.

General form of the head and ears very similar to those of *Ch. macleayi*, but the outer side of the ear is marked by an obtuse-, not acute-angled notch, and there are no pointed processes above the nostrils, although on either side an obtuse process arises from the margin of the muzzle in front (Plate XXIII. fig. 4).

The horizontal cutaneous expansion projecting forwards from the under surface of the lower jaw extends considerably beyond the reflected margin of the upper lip in front, more so than in other species, but otherwise quite similar in structure.

Wings from the middle of the tibiæ and from the calcanea.

Above and beneath dark reddish brown, paler towards the extremities of the hairs.

Teeth as in *Ch. macleayi*, but the basioccipital between the cochlea is wider.

Length (of the type, an adult ♂), head and body 2″, tail 1″, head 0″·7, ear 0″·6, tragus 0″·2, forearm 1″·85, thumb 0″·25; third finger—metacarp. 1″·65, 1st ph. 0″·35, 2nd ph. 0″·6, third ph. 0″·5; fourth finger—metacarp. 1″·4, 1st ph. 0″·35, 2nd ph. 0″·4; fifth finger—metacarp. 1″·3, 1st ph. 0″·4, 2nd ph. 0″·35; tibia 0″·7, foot 0″·4.

Hab. Brazilian Subregion (Puerto Caballo, Venezuela; Mato Grosso, Brazil).

Type in the collection of the Museum of the Army Medical Department at Netley.

a. ♂ ad., al.	Puerto Caballo.	Purchased.
b, c. ♂ ad., al.	Venezuela.	Mr. Dyson [C.].

2. MORMOPS.

Mormoops*, *Leach, Transact. Linn. Soc.* xiii. p. 76 (1820-22); *Gray, Mag. Zool. & Bot.* ii. p. 491 (1838).
Mormops, *Peters, Abhandl. Akad. Berl.* 1856, p. 287.

Crown of the head greatly elevated above the face-line; ears close together or united by prolongations from their inner margins on the muzzle in front of the eyes; tragus in general form like that of *Chilonycteris*; nostrils at the extremity of the muzzle, directed downwards and forwards, not surrounded or margined by cutaneous appendages; mandible projecting slightly in front beyond the upper jaw; the chin and sides of the lip with well-developed foliaceous cutaneous processes, continuous behind at the angle of the mouth with the outer margins of the ears.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

The upper middle incisors larger than the outer incisors, with broad notched cutting-edges; the lower incisors trifid, in cross section oval, the long axis in the direction of the jaws; second lower premolars smaller than the first, but not minute, in the tooth-row. Facial portion of the skull bent upwards so that the palate is almost at right angles to the base of the cranium; this causes the skull to appear greatly raised above the face-line, though the cerebral cavity is probably not larger than in *Chilonycteris*.

Range. Tropical parts of the Neotropical Region.

This genus is closely connected with *Chilonycteris*, of which it may be said to possess almost all the characters in an exaggerated form. It contains two species, which, in their peculiar physiognomy, are probably the most remarkable among the many strange forms exhibited by the different species of this Order.

Synopsis of the Species.

a. Cutaneous band connecting the inner side of the ear-conch with the upper surface of the muzzle in front meeting the corresponding band of the opposite side behind the nostrils, but not united with it; chin-leaf deeply divided; fur reddish brown ..... 1. *M. megalophylla*, p. 455.

b. Cutaneous band connecting the inner side of the ear-conch with the muzzle united in front with its fellow of the opposite side; chin-leaf not divided; fur bright orange ..... 2. *M. blainvillii*, p. 456.

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* *Aëllo*, previously characterized by Leach, is undoubtedly a synonym of this genus, as the type of *Aëllo cuvieri* shows; but the definition of the genus is quite incorrect, as the type specimen from which it was taken had lost all trace of the cutaneous processes on the muzzle, and the number of the teeth is incorrectly given. Therefore, although the name *Aëllo* has precedence of *Mormoops*, I retain the latter, which was published at the same time and has the advantage of correct definition.

1. Mormops megalophylla.

Mormops blainvillii, *Peters* (*non Leach*), *Abhandl. Akad. Berl.* 1856, p. 289, pl. i. figs. 1–5.
Mormops megalophylla, *Peters*, *MB. Akad. Berl.* 1864, p. 381.

Ears as broad as high, appearing to be placed far down on the side of the head, owing to the great elevation of the crown of the head above the face-line; inner side of the posterior convex surface of the ear-conch connected by a broad band (arising posteriorly from the margin of the conch, and extending from the base of the ear almost to the tip) with the upper surface of the muzzle, along which it is attached, extending as far forwards as a point situated at a short distance from the nostrils, where it ends in a small erect rounded lobe, almost touching though not connected with the corresponding lobe of the opposite ear, appearing in this position like part of a small nose-leaf; on the concave surface of the ear the inner margin of the conch appears to commence by a rounded lobe, as in *Vesperugo*; the tip of the ear rounded off, not broad, the outer margin straight, the upper half directed downwards and backwards, the lower half almost horizontal, carried forwards to the angle of the mouth, from which a lobe extends along the inferior surface of the lower jaw, becoming connected in front with the foliaceous cutaneous lappets of the lower lip. The eye thus appears, as in *Synotus*, to be contained within the ear-conch. Tragus expanded above, the inner margin notched above the middle, the outer margin with a corresponding but smaller notch, from the upper and outer part of the front surface a rounded vertical process projects; in front of the base of the tragus, on the horizontal inner surface of the ear-conch, a slightly raised ridge, directed forwards and outwards, the antitragus, appears, and on the side of the face, below the eye and close to the posterior commissure of the eyelids, a wart is placed (Plate XXIII. fig. 5).

The extremity of the muzzle is sharply cut and obliquely and shortly truncated; the nasal apertures circular, separated rather widely, directed forwards and downwards, their upper margins projecting; between them a narrow vertical ridge, continuous above, with a few small projections on the muzzle on each side above and behind the sharp-edged nostrils; the upper lip is notched opposite the second upper premolar near the angle of the mouth; the lower jaw projects slightly beyond the upper one; from the front surface of the lower lip a cutaneous expansion hangs vertically downwards, whereof the lower margin is divided by a vertical incision into two lappets, and the front surface is covered with small but prominent papillæ; these chin-lappets are connected on each side with a deep cutaneous expansion arising from the sides of the lower lip, which also hangs vertically downwards at the angles of the mouth, and in front is folded upwards in the centre of each side, and their posterior surfaces are connected by a single rounded lappet, which hangs down behind the notch between them. Below and parallel to the cutaneous expansion arising from the sides of the lower lip is a

second and rather deeper expansion (described above in connexion with the ear), which extends from the wart terminating the outer margin of the ear-conch at the angle of the mouth to the posterior surface of the anterior chin-lappet (Plate XXIII. fig. 5).

Wings from the inferior and inner surface of the distal third of the tibia, from the adjoining interfemoral membrane, and from the calcaneum; interfemoral membrane very large, extending much beyond the tail, whereof the fourth vertebra perforates the membrane, and three and a half vertebræ project upon its upper surface. Tibiæ very long; feet slender, toes nearly equal in length. Volar membranes very thin and translucent; all the bones of the extremities very slender and fragile.

Fur very fine and dense, extending thinly upon the crown of the head, but forming a long and dense fringe along the sides of the upper lip, and covering the anterior surface of the erect cutaneous processes which are continuous posteriorly with the ear-conch. Above, the fur scarcely extends upon the wing- or interfemoral membranes; beneath, the wing-membrane is thinly covered as far as a line drawn from the distal third of the humerus to the distal third of the femur.

Above and beneath dark reddish brown.

Upper middle incisors much larger than the outer ones, with wide, straight, notched cutting-edges; outer incisors acutely pointed, the cusp of each directed inwards towards the middle incisor; lower incisors equal, trifid, in a semicircular row between and in front of the canines. Upper canines very long and slender, their outer margins slightly concave, as in the *Molossi*; first upper premolars short, but with a broad base, which occupies the wide space between the canine and second premolar; second upper premolar nearly equalling the lower canine in vertical extent; second lower premolar smaller than the first and third, but well developed and nearly equalling the first upper premolar in vertical extent; all the molars with very acute W-shaped cusps.

(For measurements see p. 458.)

Hab. Mexican and Brazilian Subregions (Mexico; Central America; Columbia).

a. ♂ ad., al.	Dueñas, Guatemala.	O. Salvin, Esq. [C.].
b. ♀ ad., al.	Columbia.	Purchased.
c. ad. sk.	South America.	

2. Mormops blainvillii.

Aëllo cuvieri, *Leach, Transact. Linn. Soc.* xiii. p. 71 (1820–22) (see note on genus *Aëllo* above).

Mormoops blainvillii, *Leach, l.c.* p. 77, pl. vii. figs. 1–4.

In general appearance like *M. megalophylla*, but smaller, and easily distinguished by the form of the ears, by the chin processes, and by the colour of the fur.

The summit of the inner margin of the ear-conch is distinctly notched near the cutaneous process connecting it with the muzzle;

this process, which arises from the posterior margin of the conch, is as high as the summit of the ear, from which an angular notch separates it, and its anterior prolongation extending forwards upon the muzzle is united with its fellow of the opposite side at a short distance behind the extremity of the muzzle, differing remarkably in this respect from *M. megalophylla*, in which the anterior prolongations of the inner margins of the ears, though very close together in front, are not united; the tragus terminates above in a triangular instead of in a rounded process, and in front of its base the inner surface of the ear-conch supports a round process quite different from the corresponding longitudinal low ridge in the other species; the wart, also, near the posterior commissure of the eyelids is placed directly behind, not in a plane inferior to the eye (Plate XXIII. fig. 6).

The sides of the upper lip have two distinct fleshy processes—one immediately behind the nostril, a conical longitudinal process, the second opposite the first upper premolar, a long slender process standing at right angles to the lip; near the angle of the mouth, opposite the second premolar, the upper lip is notched, as in *M. megalophylla*, but a much deeper and more projecting lobe is thus cut off which projects directly forwards from the angle of the mouth (Plate XXIII. fig. 6).

The central cutaneous process hanging from the front surface of the lower lip is not divided beneath by a vertical incision; its lower and upper margins are slightly concave and its sides straight; from the centre of its lower margin two small projections are directed downwards (Plate XXIII. fig. 6).

Wing-membranes and extremities as in the other species. The acute extremities of the calcanea project nearly 0·1 inch beyond the interfemoral membrane.

Fur bright orange throughout; quality and distribution as in *M. megalophylla*.

The following notes by the late Mr. W. Osburn are derived from an examination of a recently killed specimen:—

"Volar membrane semitransparent, and tissue so thin it dried almost before I had finished preparing the specimen; much wrinkled between elbow and hand into angular plicæ like shagreen. Nerves of interfemoral very beautiful when held against the light; one central in line of tail, giving off at right angles pairs of branches like a pinnate leaf. Fur bright chestnut, above rather paler; very long, silky, and soft. Round the shoulders it is longer, so as to form a narrow frill longer than the rest."

Mr. Osburn also noticed the "extreme fragility and thinness of its whole structure. The light was visible through the roof of the open mouth. . . . The tail was curled upwards so as to carry the interfemoral with it; this was caused by the calcaneum bearing up the interfemoral. Femora long; so that when reposing the knees were above the back, like a grasshopper's. . . . It easily took wing off a flat surface, and its efforts to escape during the night broke some of the phalangeal bones. . . . It refused flies, but it drinks greedily. The tongue was protruded; but the water taken up by it and the

foliations of the lips was sucked in with the head raised, by an action very like chewing"*.

The following are the measurements of adult specimens of *M. megalophylla* (I.) and of *M. blainvillii* (II.) respectively:—

	I.	II.
Length, head and body	2·5	2·1
,, tail	1·2	1·1
,, head	0·65	0·6
,, ear	0·65	0·55
,, tragus	0·28	0·25
,, forearm	2·15	1·75
,, thumb	0·25	0·22
,, third finger, metacarpal	1·85	1·7
,, ,, 1st phalanx	0·4	0·4
,, ,, 2nd ,,	0·9	0·75
,, ,, 3rd ,,	0·65	0·6
,, fourth finger, metacarpal	1·75	1·5
,, ,, 1st phalanx	0·5	0·45
,, ,, 2nd ,,	0·5	0·45
,, fifth finger, metacarpal	1·35	1·1
,, ,, 1st phalanx	0·7	0·6
,, ,, 2nd ,,	0·45	0·4
,, tibia	0·85	0·8
,, calcaneum	0·9	0·85
,, foot	0·45	0·3

Hab. Antillean Subregion (Cuba; Jamaica).

a. ad. sk.	(Type of *Aëllo cuvieri*, Leach.)	Mr. Brooke's Museum.
b. ad. sk.	Jamaica.	Capt. Hamilton [P.].
c. ♀ ad., al.		Sir E. Belcher.

Subfam. II. PHYLLOSTOMINÆ.

The four groups into which this subfamily has been divided (*vide* p. 447) corresponds to Prof. Peters's subfamilies of the same names. So closely, however, for the most part, are the genera of each group allied to one another, that it may be considered doubtful whether these groups should not rather be called genera, and the so-called genera subgenera. This is especially noticeable in the first group, the *Vampyri*, which includes such apparently widely different forms as *Vampyrus spectrum* and *Phyllostoma hastatum*, yet between which so many perfectly intermediate species come that it is necessary either to unite all in one genus or place the intermediate species in intermediate genera. The latter course has been adopted as more convenient, leading to less change in nomenclature, and facilitating the discrimination of the species.

Group 1. VAMPYRI.

Muzzle long, and narrow in front; the distance between the eyes generally less than, rarely equal to, the distance from the eye to the extremity of the muzzle; nose-leaf well developed, horseshoe-shaped

* P. Z. S. 1865, pp. 72, 73, 74.

in front, lanceolate behind, the horizontal portion surrounding the nasal apertures; interfemoral membrane well developed; tail generally distinct, rarely absent; inner margin of the lips not fringed.

Dentition. Inc. $\frac{4}{4}$ or $\frac{4}{2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$ or $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

Molars with W-formed cusps generally well developed; premolars very variable in size and in number (see remarks on teeth of *Stenodermata*, p. 511).

Nearly all the species of *Vampyri* appear to be insectivorous, so that the term applied to this group cannot be considered indicative of their habits. A few, if not all, probably supplement their insect diet with fruit. *Vampyrus spectrum* is said to be wholly frugivorous; and *Macrotus waterhousii*, according to the observations of Mr. Osburn (see p. 466), probably occasionally preys on small species of Bats like *Megaderma lyra* of the Eastern Hemisphere, which it resembles in many respects.

The species included in this group may be divided into two sections, according as the tail is produced to the hinder margin of the interfemoral membrane or perforates it and appears upon its upper surface. Those included in the first section fall naturally into three apparently very distinct genera; but those of the second section, although they have been divided into several genera, founded on differences in the form of the skull and on the presence or absence of the second lower premolar, yet present in their general conformation so many characters indicative of close affinity that, but for the reasons mentioned above, they would have been described here under the same generic term.

Synopsis of the Genera.

I. Tail contained in and produced to the hinder margin of the interfemoral membrane, or extending slightly beyond it.
  a. Wing-membrane attached to the base of the calcaneum and to the inferior surface of the tibia.
    a'. Nose-leaf with erect processes in front of the nasal orifices; chin with a naked space above and a longitudinal groove beneath it, bounded by two naked prominences; premolars $\frac{2-2}{3-3}$, second lower premolar minute. 3. LONCHORHINA, p. 461.
  b. Wing-membrane from the outer side of the tibia or foot.
    b'. Nose-leaf simple in front; chin with a deep V-shaped groove in front, bounded by raised naked prominences; premolars $\frac{2-2}{3-3}$, second lower premolar well developed ..... 4. MACROTUS p. 463.
    c'. Nose-leaf simple in front; lower lip and chin with a central naked space in front, bounded by small warts; premolars $\frac{2-2}{2-2}$ ..... 5. MACROPHYLLUM p. 468.

II. Tail short, perforating the interfemoral membrane and appearing upon its upper surface, or none.

a. Muzzle narrow and elongated, the distance between the eyes less than the length of the muzzle; premolars $\frac{2-2}{3-3}$.

a'. Wing-membrane from the backs of the feet.

a''. Nose-leaf well developed anteriorly, free in front and laterally; chin with a longitudinal groove margined by naked prominences; wing-membrane extending to the toes; tail very short, or none; skull narrower between the postorbital fossæ than immediately behind the canines; inc. $\frac{4}{4}$ or $\frac{4}{2}$. . 6. VAMPYRUS, p. 469.

b''. Nose-leaf narrow in front; chin with a central naked space margined by small warts; wing-membrane extending to the tarsal or metatarsal bones of the outer toe; tail distinct; skull narrower between the postorbital fossæ than in front behind the canines; inc. $\frac{4}{3}$ ..... 7. LOPHOSTOMA, p. 478.

b'. Wing-membrane from the sides of the feet.

c''. Nose-leaf well developed in front, but bound down to the muzzle; chin with a deep V-shaped groove margined by naked prominences; wing-membrane from the extremity of the tibiæ or sides of the feet; tail distinct; skull wider between the postorbital fossæ than in front behind the canines; inc. $\frac{4}{4}$ ..... 8. SCHIZOSTOMA, p. 476.

d''. Nose-leaf narrow in front, both it and the extremity of the muzzle with numerous small warts; chin with a long V-shaped groove margined by many small warts; wing-membrane extending to the tarsus; skull narrower between the postorbital fossæ than in front behind the canines; inc. $\frac{4}{4}$..... 9. TRACHYOPS, p. 481.

e''. Nose-leaf narrow in front; chin with a V-shaped naked space margined by small warts; wing-membrane extending to the metatarsus; skull much wider between the postorbital fossæ than in any part anterior to the orbits; inc. $\frac{4}{4}$. 10. PHYLLODERMA, p. 482.

b. Muzzle shorter and broader, the distance between the eyes equal to or slightly greater than the length of the muzzle; premolars $\frac{2-2}{2-2}$.

f''. Nose-leaf well developed and free in front; chin with a deep V-shaped groove margined by small warts; wing-membrane extending to the ankles; skull narrower between the postorbital fossæ than immediately behind the canines; inc. $\frac{4}{4}$ ..... 11. PHYLLOSTOMA, p. 484.

g''. Nose-leaf as in *Phyllostoma* in front, longer behind; chin with a naked longitudinal V-shaped space margined by small warts; wing-membrane extending to the base of the toes; skull much narrower between the postorbital fossæ than behind the canines; inc. $\frac{4}{3}$ ..... 12. TYLOSTOMA, p. 488.

h''. Nose-leaf narrow in front, very large behind; chin with a broad naked space divided by a central groove; wing-membrane from the ankles; inc. $\frac{4}{2}$ ..... 13. MIMON, p. 491.

i''. Nose-leaf as in *Schizostoma*; chin with a central wart margined by small warts; molars narrow, with obtuse-angled W-shaped cusps; skull wider between the postorbital fossæ than in front behind the canines; zygomatic arches deficient; inc. $\frac{4}{4}$ ..... 14. CAROLLIA, p. 492.

j''. Nose-leaf and chin-warts as in *Carollia*; molars very narrow, without distinct W-shaped cusps; skull wider between the postorbital fossæ than in front; tail none. 15. RHINOPHYLLA, p. 495.

3. LONCHORHINA.

Lonchorhina, *Tomes, P. Z. S.* 1863, p. 81.

Muzzle cylindrical; nose-leaf very large, the horizontal portion developing a thickened crest in front of the nasal apertures, and a very long lancet-shaped leaf behind them; lower lip grooved in front, with a raised naked cushion on either side; ears large and separate, the outer margin terminating near the angle of the mouth; tragus much elongated; antebrachial membrane well developed; tail long, contained in and produced to the hinder margin of the interfemoral membrane, as in the *Vespertilionidæ*; wing-membrane from the cal-

caneum and inferior surface of the tibia and ankle, as in the *Mormopes*.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$. Second lower premolar minute.

This genus, represented as yet by a single species only, appears to come most closely of all the genera of this subfamily to the *Lobostominæ*. It agrees with *Mormops* and *Chilonycteris* in the peculiar attachment of the wing-membrane to the calcaneum, and in the very deep outer margin of the ear-conch, and with the latter genus, to a considerable extent, in the form of the skull. The projections also from the front surface of the horizontal nose-leaf recall the much smaller projections from the extremity of the muzzle in *Chilonycteris*, with which genus the single species also agrees in the concave frontal and arched nasal bones, and in the direction forwards of the nasal opening in the skull.

1. Lonchorhina aurita.

Lonchorhina aurita, *Tomes, P. Z. S.* 1863, p. 83, pl. xii.; *Peters, MB. Akad. Berl.* 1866, p. 673.

Crown of the head slightly elevated above the face-line; muzzle cylindrical, obtuse in front: ears large and broad, longer than the head; inner margin of the ear-conch strongly convex, tip shortly rounded off, slightly inclined outwards owing to a concavity immediately beneath, below which the outer margin becomes convex, and, maintaining its convexity downwards, terminates abruptly near the angle of the mouth directly below the anterior angle of the eye: tragus long, reaching its greatest width opposite the base of the inner margin, above which it tapers to an acute tip slightly inclined outwards; above the base of the outer margin, at the widest part of the tragus, a square lobe is placed (Plate XXIV. fig. 1): nose-leaf remarkably long, as long as the ear; the posterior erect leaf in shape like an isosceles triangle, with a very acute vertical angle, its posterior surface with a prominent central longitudinal ridge but slightly marked in front; at the base of the leaf on either side the valvular nasal apertures are placed, and directly in front of each a thickened acutely pointed process about one tenth of an inch in length, between which the horizontal nose-leaf develops a central thickened obtusely pointed process, having a horizontal offset at either side, and connected at its base posteriorly by a band with the base of the large terminal leaf; front margin of the nose-leaf distinct and free from the muzzle, slightly notched in front; lower lip with a small central transverse naked space above, and a narrow groove beneath in front, with a raised naked cushion on either side (Plate XXIV. fig. 1).

Antebrachial membrane developed along the forearm, and enclosing the metacarpal bone of the thumb, which exceeds the first phalanx in length; first phalanx of the middle finger slightly more than one third the metacarpal bone; wing-membrane sheathing the extremity of the tibia, and arising from the proximal extremity of the cal-

caneum; foot long and slender, two thirds the length of the tibia; tail terminating exactly at the margin of the large interfemoral membrane, the posterior margin of which is angular, and when expanded extends beyond the feet.

Fur light reddish brown, not extending upon the membranes.

Skull narrow and moderately long, the brain-case vaulted and raised above the face-line; frontals depressed, a deep but short concavity occupying this part of the skull; nasal bones arched, their extremities projecting in front over the nasal orifice, which is directed forwards (Plate XXVI. fig. 1); basioccipital deeply excavated on each side between and in front of the cochleæ, the excavations separated by a narrow central longitudinal osseous lamina; bony palate extending as far back as the centres of the zygomatic arches.

Central upper incisors obliquely chisel-shaped; outer incisors filling up the space between them and the canines, each with a short acutely pointed cusp directed inwards and downwards, not equalling half the inner incisor in vertical extent; first upper premolar very small; last upper molar nearly half the antepenultimate molar; lower incisors small, chisel-shaped, equal, not crowded; first lower premolar nearly equal to the third in cross section at its base, but one third less than it in vertical extent; second lower premolar minute, in the tooth-row, almost concealed by the adjoining teeth.

Length, head and body 2″·4, tail 2″·2, head 0″·9, ear 1″·15 × 0″·8, tragus 0″·7, nose-leaf 1″·05, forearm 2″, thumb 0″·35; third finger—metacarp. 1″·8, 1st ph. 0″·6, 2nd ph. 1″, 3rd ph. 0″·5; fourth finger—metacarp. 1″·7, 1st ph. 0″·5, 2nd ph. 0″·55; fifth finger—metacarp. 1″·65, 1st ph. 0″·5, 2nd ph. 0″·55; tibia 0″·8, foot 0″·5.

Hab. ? Trinidad, West Indies.

The only specimen of this very remarkable species as yet obtained is preserved in the collection of the Museum of the Army Medical Department at Netley.

4. MACROTUS.

Macrotus, *Gray, P. Z. S.* 1843, p. 21.

Muzzle conical, elongated; nose-leaf small, at the extremity of the muzzle, horseshoe-shaped in front, triangular behind, the nostrils pierced in the centre of the anterior leaf, not depressed; lower lip grooved in front, with a raised naked cushion on each side; ears large, united, tragus elongated; first phalanx of the middle finger not exceeding half the metacarpal bone in length; antebrachial membrane well developed; tail long, contained in and produced to the posterior margin of the large interfemoral membrane, beyond which it projects.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

Upper middle incisors unicuspidate and long; lower premolars nearly equal in vertical extent.

Range. The Mexican and Antillean Subregions of the Neotropical Region.

Synopsis of the Species.

a. Ears longer than the head; front margin of the nose-leaf raised above the front of the muzzle; the last caudal vertebra free 1. *M. waterhousii*, p. 464.

b. Ears as long as the head; front margin of the nose-leaf scarcely defined, continuous with the upper lip; last caudal vertebra and half the antepenultimate vertebra free ..... 2. *M. bocourtianus*, p. 467.

1. Macrotus waterhousii.

Macrotus waterhousii, *Gray, P. Z. S.* 1843, p. 21.

? Macrotus californicus, *Baird, Proc. Acad. Nat. Sci. Philad.* 1858, p. 117; *Allen, Monogr. Bats of North America*, p. 3, figs. 2, 3 (head and ear), 1864.

? Macrotus mexicanus, *Saussure, Revue et Mag. Zoolog.* xii. p. 486 (1860).

Macrotus minor, *Gundlach, Peters, MB. Akad. Berl.* 1864, p. 381.

The crown of the head is slightly elevated above the face-line; muzzle narrow, cylindrical; the distance between the eyes less than the distance of the eye from the end of the muzzle; a very deep groove on the side of the face immediately beneath and extending slightly in front of the eye; ears large, oval, longer than the head, conjoined by a deep band arising above and between the eyes; inner and outer margins of the ear-conch slightly convex, broadly rounded off above; the outer margin shortly notched opposite the tragus: tragus much longer than broad, narrowed in upper third and acutely pointed; inner margin convex, becoming straight above; outer margin with a square lobe above the base with a projecting upper angle, above this slightly concave or straight: nose-leaf small, at the extremity of the muzzle, the horizontal anterior portion circular, the front margin bound down to but distinct from the upper lip (Plate XXV. fig. 1); the nostrils in the centre of each lateral half, not depressed; nasal apertures lunate; the posterior erect leaf arising directly from the posterior margin of the horizontal leaf, triangular, the vertical angle narrowly rounded off, the front surface smooth, naked, in length equal to the breadth of the horizontal leaf; lower lip deeply grooved above and in front, the sides of the groove margined by naked raised edges (Plate XXV. fig. 1).

First phalanx of the middle finger less than half the length of the metacarpal bone. Volar membranes well developed; the antebrachial membrane extends the whole length of the forearm and includes half the thumb. Wings from the tibiæ near the ankles. Tail long, contained in and produced to the posterior edge of the large interfemoral membrane, projecting by the last caudal vertebra beyond it; interfemoral membrane concave between the extremities of the calcanea, which are equal to the foot in length.

Fur long, scarcely extending upon the membranes; the interfemoral is almost naked; the forearm and legs are quite naked.

The face is thinly covered with short hairs. Above, yellowish white at the base of the hairs, then dark reddish brown; beneath paler reddish brown; females always darker.

Upper middle incisors narrow, close together, moderately long and unicuspidate; outer incisors very short, scarcely raised above the gum, occupying the space between the middle incisors and the canines; first upper premolar narrow and long (in antero-posterior diameter at the base), with an oblique cusp directed forwards and downwards towards the canine, against which it is closely approximated; second premolar with a single conical cusp directed downwards and slightly backwards, so that a considerable space exists between the cusps of the first and second premolars, though their bases are close together; molars with W-shaped cusps much broader than the internal flat projecting base; last molar scarcely one third the antero-posterior diameter of the antepenultimate molar; lower incisors very small and equal, forming a semicircle across the narrow space in front of the canines; lower premolars nearly equal in vertical extent, but the first premolar is greatest in cross section, and the third is nearly equal to the second.

The space between the last molars is less than half the length of the bony palate, which does not extend as far backwards as the middle of the zygomas; roof of the mesopterygoid fossa divided by a prominent longitudinal bony ridge, which is traversed by a canal; basisphenoid not excavated between the auditory bullæ, no post-orbital processes of the frontals.

Length, head and body 2″·55, tail 1″·4, tail free from membrane 0″·2, head 1″, ear 1″·2, tragus 0″·45, nose-leaf 0″·35, forearm 2″·15, thumb 0″·5; third finger—metacarp. 1″·5, 1st ph. 0″·68, 2nd ph. 0″·7, 3rd ph. 0″·55; fourth finger—metacarp. 1″·45, 1st ph. 0″·6, 2nd ph. 0″·6; fifth finger—metacarp. 1″·6, 1st ph. 0″·55, 2nd ph. 0″·5; tibia 0″·85, calcaneum 0″·5, foot 0″·5.

Hab. California; Mexico; Jamaica; Cuba; Hayti.

I have not seen the types of *M. californicus* and *M. mexicanus*, but, judging from the descriptions, they appear to be quite identical with this species. Of *M. californicus* Mr. Allen remarks (*l. c.* p. 4) that, compared with *M. waterhousii*, "the chin-plates are less acutely defined; the internal border of the tragus is much thickened, and the revoluted portion at the base of the external border is slightly swollen. The fur is bicoloured; central portion dark brown instead of fawn. The nose is about the same height; the tail, however, is 0·25 inch shorter. The dentition is similar."

M. minor, Gundlach, Peters (subspecies), appears to be a small variety, or perhaps a small example only of this species, with the forearm 1″·85 long, the ear 1″, and the nose-leaf 0″·2.

This species in external form resembles *Megaderma lyra* of India, agreeing with that species and with the other species of the subgenus *Megaderma* in the long conical muzzle, in the deep groove in the front of the lower lip bounded by raised naked cushions, in the large rounded ears, in the large eyes, and in the great development of the volar membranes. So great, indeed, is the general resem-

blance of the species of *Megaderma* to *Macrotus* that Wagner united this genus with *Megaderma*, *Rhinopoma*, and *Nycteris* in his subfamily *Megadermata*.

This resemblance in structure between species of such widely separated genera indicates some similarity in habits; and the observations of the late Mr. Osburn on *M. waterhousii* appear to show some agreement at least between its habits and those of *Megaderma lyra*, as described by Mr. Blyth (vide *suprà*, p. 155). Mr. Osburn having obtained several females of *M. waterhousii* with and without young, placed a young Bat which had lost its mother in the same cage with a female that was not giving milk. When the young animal tried to cling to her, as to its mother, she seized it in a savage manner, biting it and holding the head between her teeth. Afterwards on examining the stomach of this female, it was found full of coagulated blood, part of which was entering intestine. This agrees closely with Mr. Blyth's account of the habits of an individual of *Megaderma lyra*, which he caught in the act of sucking the blood from a small Bat, which it afterwards devoured. As *Megaderma lyra* has been shown to feed also upon frogs and grasshoppers, and probably on other insects, so *Macrotus waterhousii* was found to vary its diet still more, its food consisting not only of insects, and probably of small Bats, but also of fruits. Mr. Osburn, writing from St. Ann's, Jamaica, remarks:—"My host, in an open verandah, showed me a number of spirts on the wall, on examining which I could detect seeds of the fustic berry (*Morus tinctoria*) sticking to the wall in the dried pulp by which they were surrounded. These, he said, were, to his great annoyance, produced by the Long-eared Bat (*Macrotus*). They came in at night, hitched themselves up, when a chewing might be distinctly heard, and then these splashes on the wall. One let the wings and legs of a large grasshopper drop. The berries Dr. Rose particularly mentioned were the fustic, the bread-nut (*Brosimum alicastrum*), and the rose-apple (*Eugenia jambos*)."

In the stomach of one individual "a yellowish mass, with fragments of harder parts of insects interspersed," was found, among which two short legs with powerful double claws attached belonging to some species of Orthoptera.

This species, as in all species in which the antebrachial membrane is well developed, margining the forearm, is quite unfitted for walking on a flat surface. Mr. Gosse remarks that when placed on a horizontal surface they do not run, but leap into the air at once, readily taking to flight; and Mr. Osburn found that three or four hours on a flat surface had made the wrists of the specimens observed by him inflamed and sore. He also notices that *Macrotus* is especially a cave-haunting genus: "when inhabiting houses these Bats always live in the cellars below ground, they are never found in the roofs."

The specimens of this species observed by Mr. Gosse were found infested with *Strebla vespertilionis*, which flew away from among their fur even while yet alive.

a. ♂ ad., al. (type).	Hayti.	J. Hearne, Esq. (Zool Soc. Coll.).
b, *c*. ♀ ad., al.	St. Domingo.	M. Sallé [C.].
d–*f*. ad. sks.	Jamaica.	R. Parnell, M.D. [P.].
g. ♀ ad., al.	Jamaica.	P. H. Gosse, Esq. [C.].
h. ad. sk.	Jamaica.	P. H. Gosse, Esq. [C.].
i–*k*. ♂ ad., al.	Bluefields, Jamaica.	P. H. Gosse, Esq. [C.].
l. ♂ imm., al.	Cape St. Lucas.	Smithsonian Institute [P.].
m. skull.	Jamaica.	P. H. Gosse, Esq. [C.].

2. Macrotus bocourtianus.

Macrotus bocourtianus, *Dobson, Ann. & Mag. Nat. Hist.* xviii. p. 436 (1876).

Ears as long as the head; front margin of the nose-leaf scarcely defined, continuous with the upper lip; terminal leaf narrow and subacutely pointed; last caudal vertebra and half the antepenultimate vertebra free; the free portion of the tail nearly equal to the thumb in length.

Teeth as in *M. waterhousii*. Fur dark brown above, paler beneath.

Length (of a specimen not quite full-grown), head and body 2″·15, tail 1″·35, tail free from membrane 0″·4, head 1″, ear 1″, tragus 0″·4, nose-leaf 0″·3, forearm 2″·05, thumb 0″·5; third finger—metacarp. 1″·5, 1st ph. 0″·68, 2nd ph. 0″·7, 3rd ph. 0″·6; fourth finger—metacarp. 1″·4, 1st ph. 0″·65, 2nd ph. 0″·55; fifth finger—metacarp. 1″·6, 1st ph. 0″·6, 2nd ph. 0″·45; tibia 0″·85, calcaneum 0″·35, foot and claws 0″·45.

Hab. Guatemala (Vera Paz).

The above description was taken from the largest of four specimens preserved in the Paris Museum, obtained by M. Bocourt in Vera Paz, Guatemala, which, through the kindness of M. Alph. Milne-Edwards, I was enabled to examine and describe. All the specimens agree in the remarkable length of the projecting portion of the tail, and in other characters described above.

Both *M. californicus*, Baird, and *M. mexicanus*, Saussure (evidently synonyms of *M. waterhousii*), are described as having the last caudal vertebra alone free; and in Mr. Allen's description* of *M. californicus* the length of the free portion of the tail is given as 0″·2. I have examined many specimens of *M. waterhousii* of different ages; and in all I have found the last caudal vertebra alone free.

Although the specimens in the Paris Museum are not full-grown, as the extremities of the finger-bones show, yet the metacarpal and phalangeal bones are as long as those of perfectly adult specimens of *M. waterhousii*. It follows, therefore, that this species is larger than *M. waterhousii*.

* *Op. cit.* p. 3.

5. MACROPHYLLUM.

Macrophyllum, *Gray, Mag. Zool. & Bot.* ii. p. 489 (1838); *Peters, MB. Akad. Berl.* 1865, p. 504.

Muzzle cylindrical, elongated; horizontal nose-leaf well developed, posterior erect leaf large; ears separate, moderate, tragus long, acuminate; lower lip with a central circular wart surrounded by smaller warts; antebrachial membrane well developed, continued along the forearm to the thumb; first phalanx of the middle finger considerably less than half the length of the metacarpal bone; tail contained in and produced to the hinder margin of the interfemoral membrane; wing-membrane from the distal extremity of the tibia.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

1. Macrophyllum neuwiedii.

Phyllostoma macrophyllum, *Wied, Beitr. zur Naturgesch. Brasil.* ii. p. 118 (1825); *Wagner, Suppl. Schreb. Säugeth.* i. p. 434 (1844), v. p. 622 (1855).
Macrophyllum nieuwiedii, *Gray, Mag. Zool. & Bot.* ii. p. 489 (1838).
Macrophyllum neuwiedii, *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 50, pl. viii. fig. 2, pl. x. figs. 3, 3 *a* (1855); *Peters, MB. Akad. Berl.* 1865, p. 504; *Gray, P. Z. S.* 1866, p. 113.

Ears slightly longer than the head; inner margin of the ear-conch regularly convex, tip rounded off, upper third of the outer margin concave, then gradually convex and continuing so to the base; tragus attenuated upwards and acutely pointed, the outer margin with two small tooth-like projections above the base; horizontal horseshoe-shaped nose-leaf extending almost to the margin of the upper lip though rather small; the erect lanceolate leaf equals in length nearly double the width of the horseshoe, and is as broad as it at its base, its front surface is marked by a strong and broad raised ridge; lower lip with a central circular wart surrounded by small warts; thumb short, the metacarpal bone equals the first phalanx in length; tail produced to, and terminating exactly at the margin of, the interfemoral membrane, which forms a straight line between the extremities of the long calcanea; calcaneum longer than the tibia and equal to half the forearm in length; feet very large.

Fur, above, soot-brown, slightly paler beneath; wing-membrane naked.

Middle upper incisors unicuspidate, converging forwards and inwards; outer incisors very small, with oblique cusps directed inwards (Plate XXIV. fig. 2); first upper premolar scarcely one third the size of the second, with an oblique cusp directed forwards; lower incisors equal, in a semicircle, summits slightly pectinate; first and second lower premolars nearly equal in cross section, the second exceeding the first in vertical extent.

Length, head and body about 2″·5, tail 1″·5, head 0″·6, ear 0″·65, tragus 0″·3, nose-leaf 0″·5, forearm 1″·5, thumb 0″·3; third finger—metacarp. 1″·4, 1st ph. 0″·5, 2nd ph. 0″·65, 3rd ph. 0″·4; fourth finger—metacarp. 1″·3, 1st ph. 0″·4, 2nd ph. 0″·52; fifth finger—metacarp. 1″·4, 1st ph. 0″·35, 2nd ph. 0″·45; tibia 0″·7, calcaneum 0″·75, foot 0″·5.

Hab. Brazil (Bahia; Mucuri River).

The above description has been taken from the specimen in the collection of the Paris Museum, figured by Gervais.

a. ad. sk.	Bahia.	Comte de Castelnau [C.].
b. skull of *a*.		

6. VAMPYRUS.

Vampyrus, *Geoffroy, Leach, Trans. Linn. Soc.* xiii. pp. 74, 75 (1822); *Tomes, P. Z. S.* 1861, p. 104; *Peters, MB. Akad. Berl.* 1865, p. 504.

Muzzle narrow, elongated; crown of the head slightly elevated; nose-leaf moderate, horseshoe-shaped membrane well developed, with expanded free edges; lower lip widely grooved in front, with a raised naked longitudinal ridge on either side of the groove; ears large, separate, outer margin of the ear-conch terminating shortly in front of the base of the tragus; tragus elongated, with prominent external marginal processes; tail very short or none; interfemoral membrane well-developed; wings from the base of the outer toes, attached to the backs of the feet as in the family Pteropodidæ; the first phalanx of the middle finger more than half the length of the metacarpal bone and nearly as long as the second phalanx.

Dentition. Inc. $\frac{4}{4}$ or $\frac{4}{2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

Lower outer incisors external to the tooth-row or absent; molars rather narrow, with well-developed W-shaped cusps. Skull long and narrow in front; but its breadth at the anterior extremities of the nasal bones is greater than between the temporal fossæ.

Range. Neotropical Region (Antillean, Mexican, and Brazilian Subregions).

Synopsis of Subgenera and Species.

I. Tail none; incisors $\frac{4}{4}$ ..... Subgenus VAMPYRUS.

a. The second lower premolar nearly as large as the first, in the tooth-row; forearm 4″·2 ..... 1. *V. spectrum*, p. 470.

II. Tail short; incisors $\frac{4}{2}$ ..... Subgenus CHROTOPTERUS.

b. The second lower premolar considerably smaller than the first and drawn inwards; forearm 3″·2 ..... 2. *V. auritus*, p. 471.

1. Vampyrus spectrum.

Vespertilio spectrum, *Linn. Syst. Nat.* ed. xii. p. 46; *Schreb. Säugeth.* i. p. 159, pl. xlv. (1775).

Phyllostoma spectrum, *Geoff. Ann. du Muséum*, xv. p. 174, pl. xi. (head and skull).

Vampyrus spectrum, *Leach, Trans. Linn. Soc.* xiii. p. 80 (1822); *Tomes, P. Z. S.* 1861, p. 104; *Peters, MB. Akad. Berl.* 1865, p. 504.

This species may be at once distinguished by its large size and peculiar physiognomy. It is the largest known species of Bat from the New World, being considerably larger than *Phyllostoma hastatum*, which approaches it most closely in size.

Head very long, muzzle long and narrow, the eye is much closer to the ear than to the extremity of the muzzle; ears large, but shorter than to the head, oval, evenly rounded off above, the inner margin of the conch regularly convex, the outer slightly so in upper three fourths, forming near its anterior termination in front of the base of the tragus a small thickened process; tragus abruptly narrowed on both sides in its upper third, terminating in a narrow needle-shaped process, lower two thirds of the outer and inner margins convex, at the base of the outer margin a square-sided lobe succeeded above opposite the base of the inner margin by a small tooth-like projection; nose-leaf broadly lanceolate-ovate, the erect portion nearly as broad as the horseshoe at its base, horseshoe with a projecting free margin expanded and bent upwards laterally; lower lip and chin with a wide groove in front, bounded by a narrow naked ridge on either side.

Wing-membrane extending to the end of the proximal third of the outer toe; feet rather small; calcaneum three fourths the length of the tibia; interfemoral membrane large, extending, when expanded, beyond the feet; tail none.

Fur short above and beneath, scarcely extending upon the membranes; face in front of the ears nearly naked; under surface of the body very thinly clothed. Above reddish brown; beneath reddish yellow.

Canines, in both jaws, very large, encroaching so much on the space occupied by the incisors that the outer incisors above and beneath are pressed forwards partially out of the tooth-row; upper middle incisors rather short, chisel-shaped, with straight, unnotched cutting-edges; first upper premolar with a short cusp and a long posteriorly projecting base meeting the anteriorly projecting base of the second premolar, so that the cusps of these teeth are widely separated (Plate XXIV. fig. 3 *a*); upper molars narrow, with very acute, long, W-shaped cusps, and with a broad flat-crowned horizontal projection from their posterior sides scarcely raised above the level of the gum; last upper molar consisting of a transverse lamina only; lower molars much narrower, their long, acutely pointed, anterior cusps received into the deep spaces between the inner halves of the upper molars, which touch by their cusps externally. The

tooth-rows of opposite sides in the upper jaw are almost parallel, the inner margins of the posterior molars being as close together as the first premolars (Plate XXIV. fig. 3).

The skull is much narrowed between the postorbital fossæ, where its transverse diameter is less than at a point corresponding to the first upper premolar; the sagittal crest is much developed posteriorly, and the supraoccipital crest forms a prominent process projecting very considerably over the concave occipital bone; the mastoid and paroccipital processes are much expanded, and the basioccipital between the auditory bullæ osseæ is wider than long and slightly excavated; the bony palate is abruptly narrowed behind the last molar, and extends as far back as the middle of the zygomatic arch; the mesopterygoid fossa very narrow (Plate XXIV. fig. 3).

Length, head and body 5″·5, tail 3″, head 2″·2, ear 1″·8, tragus 0″·55, nose-leaf 0″·75 × 0″·45, forearm 4″·2, thumb 1″·3; third finger—metacarp. 2″·9, 1st ph. 1″·55, 2nd ph. 1″·9, 3rd ph. 1″·4; fourth finger—metacarp. 3″·1, 1st ph. 1″·25, 2nd ph. 1″·5; fifth finger—metacarp. 3″·5, 1st ph. 1″·2, 2nd ph. 1″·55; tibia 2″, calcaneum 1″·6, foot 1″·2.

Hab. Central America (Guatemala, Nicaragua, Costa Rica, Panama); Jamaica; Guianas; Brazil.

This species, believed by the older naturalists to be thoroughly sanguivorous in its habits, and named accordingly by Geoffroy, has been shown by the observations of modern travellers to be mainly frugivorous, and is considered by the inhabitants of the countries in which it is found perfectly harmless.

The stomach forms a simple pouch as in the insectivorous Bats, with the cardiac and pyloric orifices rather close together, the latter opening wide; the mucous membrane is thickened and arranged in broad folds. In the stomach of one individual I found some vegetable matter of rather firm consistence, apparently portion of the rind of some large fruit.

a. ad. sk.	Jamaica.	J. S. Redman, Esq. [P.].
b. ♀ ad., al.	Realijo, Nicaragua.	Sir E. Belcher [C.].
c. ad. sk.	Isthmus of Panama.	O. Salvin, Esq. [C.]
d. ad. sk.	Cosnipata.	Purchased.
e. ♂ ad., al.	British Guiana.	Purchased.
f. ♂ ad., al.		M. Lidth de Jeude.
g. ad. sk.		St. George Mivart, Esq. [P.].
h. ♂ ad. skeleton.		M. Lidth de Jeude.
i. skull.	Jamaica.	J. S. Redman, Esq. [P.].
j. skull.		M. Lidth de Jeude.

2. Vampyrus auritus.

Vampyrus auritus, *Peters, Abhandl. Akad. Wissensch. Berl.* 1856, p. 305, pl. ii. figs. 1–5; *Temes, P. Z. S.* 1861, p. 104, pl. xviii.
Chrotoptems auritus, *Peters*, M*B. Akad. Berl.* 1865, p. 505.

Considerably smaller than *V. spectrum*, but with similarly large ears, which differ only from those of that species in the smaller and

less thickened antitragus; general form of the nose-leaf also as in *V. spectrum*, the horseshoe more equally developed all round and projecting more in front; front of the lower lip with a small wart in the centre and a narrow transverse elevation on either side; chin divided by a narrow groove between two warts (Plate XXIV. fig. 4); opposite the anterior extremity of the sternum the small circular aperture of a glandular duct.

Wings and interfemoral membrane as in *V. spectrum*; but the calcaneum is comparatively shorter, and in the base of the interfemoral membrane a rudimentary tail, scarcely one fifth of an inch in length, may be discerned with some difficulty.

Fur much longer than in *V. spectrum*, especially on the upper surface, thickly clothing the body above and beneath, but scarcely extending upon the membranes; the metacarpal bone of the thumb, the basal half of the interfemoral membrane, and the legs are thinly covered with short fur. Above dark brown, at the base and at the extremities of the hairs whitish; beneath greyish brown, the hairs darker in the middle, paler at their bases and at their extremities.

Upper middle incisors comparatively longer and narrower than in *V. spectrum*, directed downwards and inwards; outer incisors very small, between the middle incisors and the canines; the two lower incisors chisel-shaped, indistinctly notched; first upper premolar quite different from that of *V. spectrum*, being very small and scarcely raised above the level of the gum (Plate XXIV. fig. 4 *a*); the second lower premolar is also very small, and quite internal to the tooth-row, not visible from without, the first and third premolars closely approximated; first lower premolar about two thirds the size of the third premolar, which is comparatively larger than the corresponding tooth in *V. spectrum*.

Length (of an adult ♂), head and body 4″, tail 0″·2, head 1″·55, ear 1″·6, tragus 0″·45, nose-leaf 0″·65 × 0″·4, forearm 3″·35, thumb 1″; third finger—metacarp. 2″·3, 1st ph. 1″·3, 2nd ph. 1″·5, 3rd ph. 1″·3; fourth finger—metacarp. 2″·5, 1st. ph. 1″·05, 2nd ph. 1″·2; fifth finger—metacarp. 2″·8, 1st ph. 1″·05, 2nd ph. 1″·15; tibia 1″·45, calcaneum 0″·95, foot 0″·95.

Hab. Mexico; British Guiana; Brazil.

This very remarkable species connects *Vampyrus* with *Lophostoma*, *Tylostoma*, and *Phyllostoma*. With the species of *Lophostoma* it agrees closely in the form of the skull and in the dental formula, with *Tylostoma* in the form of the incisors and premolars, and with *Phyllostoma* in the presence of a glandular opening near the anterior extremity of the sternum.

a. ad. sk.	Rio de Janeiro. (Figured in P. Z. S. 1861, pl. xviii.)	Earl of Derby [P.].
b. ad. sk.	Rio de Janeiro.	Earl of Derby [P.].
c. ♀ ad., al.	Brazil.	Dr. Peters [E.].

7. LOPHOSTOMA.

Lophostoma, *D'Orbigny, Voy. dans l'Amérique mérid.* p. 11 (1847); *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 48 (1855).

General form of the head as in *Vampyrus*, but the horseshoe-shaped portion of the nose-leaf very narrow in front of the nasal openings, and bound down to the muzzle; chin with a central wart, margined laterally by smaller warts; ears large, as long or longer than the head, separate or united at their bases; tail short, perforating the large interfemoral membrane and appearing upon its upper surface; wing-membrane from the dorsal surface of the tarsal or metatarsal bone of the outer toe; first phalanx of the middle finger less than half the metacarpal bone.

Dentition. Inc. $\frac{4}{2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

Second lower premolar minute, in the tooth-row or in the outer angle between the first and second premolars. Skull long and narrow, the width between the temporal fossæ equal to or less than that of the muzzle across the nasal bones.

Range. Brazilian Subregion.

This genus is quite intermediate between *Vampyrus* and *Phyllostoma*, resembling the former in the general shape of the skull, the latter in the shorter muzzle and in the warts of the lower lip.

Synopsis of the Species.

a. Ears separate, not exceeding the head in length; skull nearly as wide between the postorbital fossæ as at the first upper premolar.
  a'. Fur, above, unicoloured, dark brown; forearm 2″·1, tibia 0″·85 ..... 1. *L. bidens*, p. 473.
  b'. Fur, above, bicoloured, white at the base of the hairs, towards the extremities dark brown; forearm 1″·45, tibia 0″·75 . 2. *L. brasiliense*, p. 474.
b. Ears considerably longer than the head, united by a low band across the forehead; skull much narrower between the postorbital fossæ than at the first upper premolar.
  c'. Fur, above, brown, whitish at the base of the hairs; forearm 2″·2, tibia 1″ ..... 3. *L. amblyotis*, p. 475.

1. Lophostoma bidens.

Vampyrus bidens, *Spix, Simiar. et Vespertil. Brasil.* p. 64, pl. xxxvi. fig. 5 (1823).
Phyllostoma childreni, *Gray, Mag. Zool. & Bot.* ii. p. 488 (1838).
Tylostoma childrenii, *Gray, P. Z. S.* 1866, p. 114.
Lophostoma bidens, *Peters, MB. Akad. Berl.* 1865, p. 509.

Ears as long as the head, separate; ear-conch much longer than

broad, narrowly rounded off at the tip; inner margin strongly convex below, decreasingly convex upwards; outer margin slightly convex, almost straight, terminating without forming a lobe midway between the base of the tragus and the angle of the mouth: tragus rather long and attenuated in upper third, which is not curved outwards; about the middle of its outer margin two small tooth-like projections: nose-leaf shorter than the tragus, ovate-lanceolate; horseshoe-shaped nose-leaf scarcely developed in front of the nasal apertures; lower lip with three superior warts, bounded by a double row of smaller warts.

Wings from the tarsi; calcaneum slightly longer than the foot; tail terminating by a slight projection on the upper surface of the basal fourth of the large interfemoral membrane.

Fur, above, dark brown throughout; beneath paler, the extremities of the hairs ashy; extending thickly upon the humerus and fleshy part of the forearm and adjoining wing-membrane, but the legs and remaining parts of the wing-membrane and the interfemoral membrane are quite naked; beneath, the distribution of the fur is similar.

Skull narrow and elongated, nearly as wide between the post-orbital fossæ as at the first upper premolar (Plate XXVI. fig. 2*c*); infraorbital foramen close to the margin of the orbit, in a line with the posterior margin of the first molar; teeth in the upper jaw very similar to those of *Phyllostoma hastatum*; in the lower jaw the canines are close together by their bases, and in front of them are two narrow unicuspidate incisors (Plate XXVI. fig. 2); first and third lower premolars equal in vertical extent, but the first is larger and directed slightly forwards, and between them and slightly to the outer side of the tooth-row the small second premolar is placed (Plate XXVI. figs. 2 *a*, 2 *b*).

(For measurements see Table, p. 476.)

Hab. Brazil (Rio Janeiro; Bahia).

a. ad. sk.	Brazil.	Purchased.
b. ad. sk.	South America.	J. G. Children, Esq. [P.].
	(Type of *Phyllostoma childrenii*, Gray.)	
c. skeleton.		

2. Lophostoma brasiliense.

Tylostoma brasiliense, *Gray, MS.*
Lophostoma brasiliense, *Peters, MB. Akad. Berl.* 1866, p. 674.

Very much smaller than *L. bidens*, but in the form of the ears, nose-leaf, and teeth, and in the relative lengths of the bones of the extremities very similar to that species. The fur is, however, different in colour and distribution, and in the single type specimen (the skin of an adult female) there is no trace of a tail.

Above, paler brown than in *L. bidens*, and the basal third of the

hairs is pale buff; beneath, light greyish brown. A narrow line of fur extends upon the humerus and fleshy part of the forearm, but the membranes are quite naked.

(For measurements see Table, p. 476.)

Hab. Bahia, Brazil.

a. ♀ ad. sk. (type).	Bahia.	Mr. Brandt [C.].

3. Lophostoma amblyotis.

Phyllostoma amblyotis, *Natt.*, *Wagner*, *Wiegm. Archiv*, 1843, p. 365; *Abhandl. Münch. Akad.* v. p. 164; *Suppl. Schreb. Säugeth.* v. p. 625 (1855).

? Lophostoma sylvicolum, *D'Orbigny*, *Voy. dans l'Amérique mérid.* p. 11 (1847); *Gervais*, *Expéd. du Comte de Castelnau*, *Zoologie*, p. 48, pl. x. fig. 6 (teeth).

Lophostoma amblyotis, *Peters*, *MB. Akad. Berl.* 1865, p. 509.

Ears longer than the head, but in general outline similar to those of *L. bidens*, united by a low band across the forehead. Nose-leaf and warts of the lower lip as in *L. bidens*.

Wing-membrane from the dorsal surface of the second metatarsal bone; calcaneum longer than the foot; tail as long as the foot, of four vertebræ, the extremity projecting.

Fur, above, brown, whitish at the base of the hairs; beneath, paler; on both surfaces extending outwards upon the proximal two thirds of the humerus; forearm naked above, but beneath the proximal third is clothed thinly with fine hairs; on the upper surface the metacarpal bone of the thumb is similarly clothed.

Second upper premolar much smaller than the canine in cross section at the base; the second minute lower premolar is as high as or slightly higher than, the cingulum of the first lower premolar. The sagittal crest is well developed, and the skull is one third narrower between the postorbital fossæ than at the point corresponding to the first upper premolar.

The above description of this species has been taken from Dr. Peters's notes on the type specimens preserved in the Vienna Museum, which I have not yet had an opportunity of examining.

(For measurements see Table, p. 476.)

Hab. Brazil (Mato Grosso).

This species, though resembling *L. bidens* in size, in the shape of the ear-conch, of the nose-leaf, and of the warts on the lower lip, is yet easily distinguished by the much greater size of the ears, which are united by a low band across the forehead, and by the greater length of the tibia.

The following Table exhibits in the first column the measurements of an adult specimen of *L. bidens*, in the second those of the type of *L. brasiliense*, and in the third the measurements of one of the types of *L. amblyotis* (as given by Dr. Peters) are shown:—

	I.	II.	III.
Length, head and body	3·0	2·5	3·0
,, tail	0·5	...	0·6
,, head	...	...	1·05
,, ear	1·0	0·85	1·3
,, tragus	0·4	...	0·43
,, nose-leaf	0·35	...	0·4
,, forearm	2·1	1·45	2·2
,, third finger, metacarpal	1·7	1·1	1·65
,, ,, 1st phalanx	0·75	0·5	0·75
,, ,, 2nd ,,	0·85	0·58	0·8
,, ,, 3rd ,,	0·65	0·65	0·75
,, fourth finger, metacarpal	1·65	1·2	1·75
,, ,, 1st phalanx	0·55	0·5	0·7
,, ,, 2nd ,,	0·7	0·6	0·8
,, fifth finger, metacarpal	1·75	1·25	1·83
,, ,, 1st phalanx	0·6	0·5	0·68
,, ,, 2nd ,,	0·65	0·5	0·72
,, tibia	0·85	0·75	1·0
,, calcaneum	0·65	0·5	0·7
,, foot	0·6	0·45	0·6

8. SCHIZOSTOMA.

Phyllophora *et* Phyllostoma, *Gray, Ann. & Mag. Nat. Hist.* 1842, p. 257.
Mimon, *Gray* (in part), *P. Z. S.* 1847, p. 14.
Schizostoma, *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 49 (1855); *Peters, MB. Akad. Berl.* 1865, p. 505.
Micronycteris, *Gray, P. Z. S.* 1866, p. 113.

Muzzle and lower lip as in *Vampyrus*, but the nose-leaf is less developed and its front margin is bound down to the underlying integument; ears large, widely apart, the bases of their inner sides conjoined by a low band generally concealed by the fur, the outer sides of the ear-conch more developed in front than in *Vampyrus*, and terminating nearer the eye, forming in all the species a well-defined lobe; tail short, perforating the large interfemoral membrane, and appearing upon its upper surface; wings from the ankles or tarsus, the first phalanx of the middle finger less than half the metacarpal bone.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

The second lower premolar well developed. Skull long and narrow in front, narrower at the extremities of the nasal bones than between the temporal fossæ (Plate XXVI. figs. 3, 3 *a*, skull of *Sch. megalotis*).

Range. Mexican and Brazilian Subregions.

This genus, though closely allied to *Vampyrus*, includes some of the smallest-sized species of the whole group, none of those known having a forearm more than 1″·85 in length, thus contrasting strongly with the species of that genus, which are the largest of the whole family Phyllostomidæ. Although resembling *Vampyrus* in general external characters, the skull is comparatively much narrower in front, the relative proportions of the lengths of the wing-bones are different, the horizontal horseshoe-shaped membrane,

though well developed, is not expanded or free in front, as in *Vampyrus*, and the wing-membrane is attached to the extremities of the tibiæ or to the sides, not the backs, of the feet.

Synopsis of the Species.

a. The second phalanx of the middle finger equal or nearly equal to the first.
  a'. Calcaneum longer than the foot.
    a''. Wings from the tarsus or metatarsus.
      a'''. Forearms and legs hairy; the second phalanx of the middle finger slightly *shorter* than the first; forearm 1''·6.. 1. *Sch. hirsutum*, p. 477.
      b'''. Forearms and legs naked; the second phalanx of the middle finger slightly *longer* than the first; forearm 1''·45. 2. *Sch. megalotis*, p. 478.
  b'. Calcaneum shorter than the foot.
    b''. Wings from the tibiæ.
      c'''. Forearms and legs naked; the first and second phalanges of the middle finger exactly equal in length; forearm 1''·35 ..... 3. *Sch. minutum*, p. 479.
b. The second phalanx of the middle finger conspicuously longer than the first.
  c'. Calcaneum much shorter than the foot.
    c''. Wings from the tarsi; forearms and legs nearly naked; forearm 1''·85 ..... 4. *Sch. behnii*, p. 479.

1. Schizostoma hirsutum.

Schizostoma hirsutum, *Peters, MB. Akad. Berl.* 1869, p. 396.

Muzzle narrow, cylindrical, the crown of the head slightly vaulted; horseshoe-shaped nose-leaf adherent to the muzzle in front, but with a distinct anterior margin; the erect lancet-shaped leaf as broad in its broadest part as the horseshoe, abruptly narrowed in its upper third and terminating shortly in a subacute point, surface smooth, no central ridge, covered with a few almost invisible hairs which are most abundant along its margin: ears slightly longer than the head, united by their inner and posterior sides by a low band concealed by the fur of the head; lower half of the inner margin of the ear-conch very convex, upper half less convex, broadly rounded off above; the outer margin slightly convex, terminating in a line with the angle of the mouth, midway between the base of the tragus and the eye; tragus narrowed upwards, reaching its greatest breadth slightly above the base of the outer margin, with a slight notch forming a very small lobule opposite the base of the inner margin; chin with two longitudinal naked elevations converging below and enclosing between them a deep V-shaped groove.

Metacarpal bone of the thumb equal to the remaining part in length; metacarpal bones of the third and fourth fingers equal, the fifth metacarpal shorter; first phalanx of the middle finger very slightly longer than the second.

Wings from the metatarsus; calcaneum slightly longer than the

foot; tail of four vertebræ, scarcely half the length of the interfemoral membrane, on the upper surface of which the last short vertebra projects.

The face is very hairy; the nose-leaf is dusted over with fine hairs, most abundant on the horseshoe and along the edges; the sides of the muzzle bristle with hairs, which form a short fringe along the upper lip; the humerus and the muscular part of the forearm are covered with long hairs, and short hairs cover the remaining part of the forearm to the carpus, becoming much longer and denser on the metacarpal bone of the thumb, fine short hairs also extending to the base of the claw of the thumb and along the whole extent of the middle finger, also upon the legs and backs of the feet to the base of the claws.

Incisors as in *Vampyrus spectrum*, but not crowded; the first lower premolar exceeds the third as much as the third exceeds the second.

(For measurements see Table, p. 480.)

Hab. Unknown. Type in the collection of the Paris Museum.

2. Schizostoma megalotis.

Phyllophora megalotis, *Gray, Ann. & Mag. Nat. Hist.* 1842, p. 237; *Voyage of the 'Sulphur,' Mammalia*, p. 18, pl. v. fig. 2 (1844).
Phyllostoma elongata, *Gray* (non *Geoffroy*), *Ann. & Mag. Nat. Hist.* 1842, p. 257.
Phyllostoma elongatum, *Gray, Voy. 'Sulphur,'* p. 19, pl. viii. fig. 2.
Mimon megalotus, *Gray, P. Z. S.* 1847, p. 14; *Ann. & Mag. Nat. Hist.* p. 406 (1847).
Phyllostoma scrobiculatum, *Wagner, Suppl. Schreb. Säugeth.* v. p. 627.
Micronycteris megalotis, *Gray, P. Z. S.* 1866, p. 113.
Schizostoma elongatum, *Gray, l. c.* p. 115.
Schizostoma megalotis, *Peters, MB. Akad. Berl.* 1866, p. 672.

Head as in *Sch. hirsutum*, the horseshoe-shaped portion of the nose-leaf narrower, in width equal to half the length of the whole leaf, its front edge continuous with the underlying integument and separated by a narrow space from the margin of the lip; the erect lancet-shaped leaf broader in its broadest part than the horseshoe, abruptly narrowed and terminating in a very acute point; front surface of the leaf smooth, without a longitudinal ridge, and naked; ears as long as the head, united by their inner and posterior sides by a band 0″·12 deep; form of the ear-conch and tragus as in *Sch. hirsutum* (Plate XXIV. fig. 5).

Metacarpal bone of the thumb longer than the phalanx, enclosed in the antebrachial membrane; metacarpal bones of the third, fourth, and fifth fingers equal, the bones of the fourth finger equal respectively to those of the fifth; the first phalanx of the middle finger very slightly shorter than the second.

Wings from the tarsus; calcaneum slightly longer than the foot; tail and interfemoral membrane as in *Sch. hirsutum*.

The fur of the body scarcely extends upon the membranes, which, with the extremities, are almost quite naked.

Upper middle incisors faintly notched on the outer side of their extremities; lower premolars nearly equal, the first slightly larger than the third, which, again, is slightly larger than the second (Plate XXVI. fig. 3 *b*).

(For measurements see Table, p. 480.)

Hab. Mexico; Central America (Honduras, Guatemala); Brazil; Bolivia.

a, *b*. ad. aks.	Mexico.	M. Sallé [C.].
c. ♀ ad., al.	Bay of Honduras.	
d. ad. sk., in al.	Dueñas, Guatemala.	O. Salvin, Esq. [C.].
e. ♀ ad., al.	Dueñas, Guatemala.	O. Salvin, Esq. [C.].
f. ad. sk.	Brazil.	
g. ♂ ? ad., al.	Brazil. (*Micronycteris megalotis*, Gray.)	
h. ad. sk.	Atacamis.	Capt. Kellett [P.].
i. ad. sk.	(Type of *Phyllophora megalotis*, Gray.)	Earl of Derby [P.].
j. ad. sk.	(*Mimon megalotis*, Gray.)	Purchased.

3. Schizostoma minutum.

Schizostoma minutum, *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 50, pl. vii. fig. 1, pl. x. figs. 5, 5 *a* (1855).

Slightly smaller than *Sch. megalotis*, the head, ears, and nose-leaf very similar to those of that species; but easily distinguished by the greater length of the foot, the shorter calcaneum, and the quality and distribution of the fur.

Second phalanx of the middle finger exactly equal to the first in length; metacarpal bone of the thumb equal to the remaining parts; metacarpal bones of the third, fourth, and fifth fingers equal, as in *Sch. megalotis*.

The wing-membrane scarcely extends to the extremity of the tibia; the calcaneum is shorter than the foot, and the latter is comparatively larger than in the preceding species.

Fur longer than in *Sch. megalotis*; the muscular part of the forearm, which in that species is almost quite naked, is here well clothed on both sides. Above, brown, the base of the hairs ashy white; beneath, ashy.

Teeth as in *Sch. megalotis*.

(For measurements see Table, p. 480.)

Hab. Brazil.

a, *b*. ad. aks.	Sta. Catherina, Brazil.	
c–*e*. ad. sks.	Brazil.	
f. ♂ ? ad., al.	South America.	Mr. Brandt [C.].

4. Schizostoma behnii.

Schizostoma behnii, *Peters, MB. Akad. Berl.* 1865, p. 505.

Larger than any of the preceding species, but with comparatively shorter ears, the ear-conch being slightly shorter than the head, externally flatly emarginate, and terminating in a lobule separated from the outer margin by a shallow notch, as in *Sch. megalotis* and the other species. Horseshoe-shaped part of the nose-leaf well de-

veloped, its front margin bound down to but not continuous with the integument beneath, much broader than the lancet-shaped leaf, which is acutely pointed. Chin with two large naked prominences, as in other species; but in the deep groove between them are three small round warts.

Second phalanx of the middle finger conspicuously longer than the first; calcaneum much shorter than the foot; tail as in *Sch. hirsutum*; wing-membrane extending to the tarsus.

The fur of the body extends outwards as far as the middle of the humerus, and to the same extent, but thinly, upon the wing-membrane; the muscular part of the forearm, the extremity of the femur, and the tibia appear naked or clothed only with a few fine hairs.

Above, brown; beneath, brownish grey; on the upper surface at the base white, then brownish, succeeded by a yellowish-white band, the extremities of the hairs brown; beneath, the hairs are whitish at the base, then brown, with brownish-grey extremities.

(For measurements see Table below.)

The above description is taken from Dr. Peters's notes on the single type specimen sent to him by Prof. Behn.

Hab. Cuyaba; Cosnipata *.

a. ♀ ad. sk.	Cosnipata.			Purchased.
	S. hirsutum.	*S. megalotis.*	*S. minutum.*	*S. behnii.*
Length, head and body	2·2	1·95	1·8	2·45
„ tail	0·6	0·55	0·5	0·55
„ head	0·85	0·8	...	0·9
„ ear	0·95	0·75	0·7	0·8
„ tragus	0·3	0·3	0·25	0·32
„ nose-leaf	0·35	0·4	0·3	0·4
Breadth of nose-leaf	0·23	0·2	0·2	0·26
Length, forearm	1·6	1·45	1·35	1·85
„ thumb	0·5	0·4	0·36	0·45
„ third finger, metacarpal	1·3	1·25	1·1	1·6
„ „ „ 1st phalanx	0·7	0·6	0·45	0·6
„ „ „ 2nd „	0·65	0·63	0·45	0·8
„ „ „ 3rd „	0·5	0·4	0·4	0·48
„ fourth finger, metacarpal	1·3	1·25	1·1	1·5
„ „ „ 1st phalanx	0·55	0·5	0·35	0·5
„ „ „ 2nd „	0·5	0·4	0·4	0·6
„ fifth finger, metacarpal	1·45	1·25	1·1	1·6
„ „ „ 1st phalanx	0·55	0·5	0·4	0·48
„ „ „ 2nd „	0·4	0·4	0·35	0·45
„ tibia	0·7	0·6	0·55	0·7
„ calcaneum	0·5	0·45	0·3	0·3
„ foot	0·45	0·38	0·4	0·48

The above measurements of *Sch. hirsutum* and *Sch. minutum* were taken by me from the types preserved in the Paris Museum; those of *Sch. megalotis* from a large female specimen obtained by Mr. Salvin from Guatemala, which I had compared with the type (an example of a not full-grown male); and those of *Sch. behnii* from Dr. Peters's original description of that species.

* The specimen from Cosnipata was found by me in the Collection while these pages were passing through the press.

9. TRACHYOPS.

Trachops, *Gray, P. Z. S.* 1847, p. 14; *Ann. & Mag. Nat. Hist.* xix. p. 406 (1847).
Trachyops, *Peters, MB. Akad. Berl.* 1865, p. 512.

Muzzle shorter than in *Vampyrus*; horizontal portion of the nose-leaf narrow in front of the nostrils, the erect leaf well developed; lower lip and chin with a longitudinal groove in front, margined by a double row of warts; muzzle with numerous conical warts; ears large, separate; the first phalanx of the middle finger shorter than half the metacarpal bone; interfemoral membrane well developed, extending far beyond the tail, which appears upon its upper surface.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

The second lower premolar small, internal.

This genus is, as yet, represented by a single species only, of wide distribution. It approaches *Phyllostoma* closely in dentition, but the form of the skull is different, more produced in front, narrower between the postorbital fossæ, and the brain-case more vaulted; the first phalanx of the third finger is much longer in comparison with the metacarpal bone than in *Phyllostoma*, and the metacarpal bone of the fifth finger is more conspicuously longer than that of the third than in any other genus of this group.

1. Trachyops cirrhosus.

Vampyrus cirrhosus, *Spix, Simiar. et Vespertil. Brasil.* p. 64, pl. xxxvi. fig. iii.
Trachops fuliginosus, *Gray, P. Z. S.* 1847, p. 14; *Ann. & Mag. Nat. Hist.* xix. p. 406 (1847).
Tylostoma mexicana, *Saussure, Rev. et Mag. Zool.* xii. p. 484 (1860).
Trachyops cirrhosus, *Peters, MB. Akad. Berl.* 1865, p. 512.

Crown of the head distinctly elevated above the face-line, muzzle cylindrical; the distance between the eyes is equal to the distance of the eye from the end of the muzzle; ears large, oval, broadly rounded off above, longer than the head; outer and inner margins of the ear-conch convex, the inner margin strongly convex in the lower third, the outer margin slightly concave opposite the tragus; lower half of the outer margin of the tragus unevenly lobed and toothed, the upper third abruptly narrowed and acutely pointed; nose-leaf in general outline similar to that of *Phyllostoma hastatum*, but much less developed in front; the erect ovate-lanceolate leaf acutely pointed, finely toothed on the edges; horizontal leaf narrow in front of the nostrils, bound down to the muzzle, margined by numerous wart-like projections; front and sides of the lips studded with small warts, which lessen in number and become smaller towards the angle of the mouth; lower lip and chin with a central longitudinal groove margined laterally and beneath by a great number of small prominent warts (Plate XXV. fig. 2).

Wing-membrane extending to the tarsus; calcaneum three fourths the length of the foot; interfemoral membrane large, slightly concave between the ends of the calcanea; tail as long as the thumb, of four short vertebræ contained in the upper surface of the interfemoral membrane.

Fur, above, dark reddish brown, the base of the hairs whitish, the extreme tips slightly ashy; beneath, paler brown to the base of the hairs, the extremities ashy.

Upper middle incisors large, slightly notched, occupying by their bases nearly the whole space between the canines; outer incisors very small, scarcely visible without a lens, not raised above the gum; lower incisors equal, not crowded (Plate XXVI. fig. 4); first upper premolar about half the size of the second, the cusp directed slightly obliquely forwards and downwards, on the whole like that of *Phyllostoma hastatum*; molars acutely tubercular, with well-defined W-shaped cusps; first lower premolar three fourths the third in vertical extent, but exceeding it in cross section; the second premolar scarcely as large as one of the lower incisors, internal to the tooth-row, and not visible from without (Plate XXVI. figs 4*a*, 4*b*). With the exception of this small second lower premolar, the teeth are very similar to those of *Phyllostoma hastatum*.

Length (of an adult ♀ from Bermuda), head and body 3″, tail 0″·55, head 1″·15, ear 1″·3, tragus 0″·5, forearm 2″·35, thumb 0″·6; third finger—metacarp. 1″·8, 1st ph. 0″·85, 2nd ph. 1″·15, 3rd ph. 0″·75; fourth finger—metacarp. 1″·85, 1st ph. 0″·65, 2nd ph. 0″·8; fifth finger—metacarp. 2″, 1st ph. 0″·65, 2nd ph. 0″·7; tibia 0″·95, calcaneum 0″·55, foot 0″·65.

Hab. Mexico; Island of Bermuda; Columbia (Bogota); Brazil (Para, Pernambuco). Said also to inhabit South Carolina; but the evidence on this point is not sufficient.

a. ♀ ad., al.	Bermuda.	
b–e. ad. sks.	Bogota, Columbia.	O. Salvin, Esq. [C.].

10. PHYLLODERMA.

Phylloderma, *Peters, MB. Akad. Berl.* 1865, p. 513.
Guandira, *Gray, P. Z. S.* 1866, p. 114.

Muzzle abruptly narrowed in front of the eyes; chin with a V-shaped space margined by small warts; nose-leaf narrow in front, bound down to the muzzle; ears separate; tail perforating the interfemoral membrane and appearing upon its upper surface; wing-membrane from the side of the foot close to the base of the toes; first phalanx of the middle finger much less than half the length of the metacarpal bone.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

Skull much broader between the postorbital fossæ than at any part in front of the orbits.

This genus, founded on a single species, approaches *Phyllostoma* very closely in general external form, but the very different shape of the skull (as first pointed out by Dr. Peters) and the dentition at once distinguish it.

1. Phylloderma stenops.

Phylloderma stenops, *Peters, MB. Akad. Berl.* 1865, p. 513; 1866, p. 674.
Guandira cayanensis, *Gray, P. Z. S.* 1866, p. 114.

Nearly as large as *Phyllostoma hastatum*, and very closely resembling that species in general external form; the ear-conch and tragus are almost quite similar, the chin has also a V-shaped naked space margined by warts, the wing-bones have very nearly the same relative proportions, and the fur agrees in quality and even in colour*. The nose-leaf is, however, smaller and narrower, and its front margin is bound down to the muzzle; the head is abruptly narrowed in front of the eyes, and the wing-membrane extends almost to the base of the toes.

Fur limited to the body and to the proximal half of the upper surface of the humerus, short, dark brown above, pale greyish brown at the base of the hairs; beneath shorter, and pale brown with greyish extremities throughout: membranes dark brown.

Upper middle incisors with notched cutting-edges, the outer incisors very short, filling up the space between the middle incisors and the canines; lower outer incisors equal to the middle pair in vertical extent, but not half their diameter in cross section (Plate XXIV. fig. 6); upper premolars as in *Phyllostoma hastatum*, but there are three lower premolars, whereof the second is minute and stands in the tooth-row.

Length (of the type of *Guandira cayanensis*, Gray), head and body about 3″·5, tail 0″·7, ear 0″·9, tragus 0″·35, forearm 2″·75, thumb 0″·55; third finger—metacarp. 2″·45, 1st ph. 0″·85, 2nd ph. 1″·2, 3rd ph. 0″·9; fourth finger—metacarp. 2″·35, 1st ph. 0″·6, 2nd ph. 0″·9; fifth finger—metacarp 2″·5, 1st ph. 0″·6, 2nd ph. 0″·65; tibia 1″·1, calcaneum 0″·55, foot 0″·65.

(The measurements of the type of *Phylloderma stenops*, Peters, are slightly greater, so that it appears probable that the type of *Guandira cayanensis* is not full-grown, although the bones of the wings seem perfectly ossified.)

Hab. Brazilian Subregion (Cayenne).

a. ♂ ? ad. sk. Cayenne.
(Type of *Guandira cayanensis*, Gray.)

* In the single male specimen in the Collection there appears to be a glandular opening in the middle of the neck, as in *Phyllostoma hastatum*.

11. PHYLLOSTOMA.

Phyllostoma, *Geoffroy, Peters, MB. Akad. Berl.* 1865, p. 514.

Muzzle much shorter than in *Vampyrus*; horizontal portion of the nose-leaf well developed, free in front and on the sides, vertical part lanceolate; ears moderate, separate; lower lip with a V-shaped groove in front margined with warts; first phalanx of the middle finger not one third the length of the metacarpal bone, and much shorter than the second phalanx; wing-membrane extending to the feet; interfemoral membrane large, extending far beyond the short tail, which appears upon its upper surface.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

The first upper premolar well developed. Skull broader at the anterior extremities of the nasal bones than between the temporal fossæ.

Range. Brazilian Subregion; Peru.

This genus, next to *Vampyrus*, includes the largest species of the family. All the species known have a gular glandular sac, well developed in males, rudimentary in females, in the inferior surface of the neck, opening directly in front of the sternum.

Synopsis of the Species.

a. Calcaneum longer than the foot.
  a'. Nose-leaf shorter than the foot; forearm 3″·2 ..... 1. *Ph. hastatum*, p. 484.
  b'. Nose-leaf longer than the foot; forearm 2″·55..... 3. *Ph. elongatum*, p. 487.
b. Calcaneum shorter than the foot.
  c'. Nose-leaf as long as the foot; forearm 2″·3 ..... 2. *Ph. discolor*, p. 487.

1. Phyllostoma hastatum.

Vespertilio hastatum, *Pallas, Spicileg. Zoolog.* iii. p. 7 (1767); *Schreb. Säugeth.* i. p. 161, pl. xlvi. B (1775); *Gmelin, Linn. Syst. Nat.* ed. xiii. p. 47 (1788).

Phyllostoma hastatum, *Geoffroy, Ann. du Muséum*, xv. p. 177, pl. 11 (head and skull) (1810); *Wied, Beitr. Naturg. Brasil.* ii. p. 179 (1836); *Tschudi, Fauna Peruana*, p. 62 (1844–46); *Burmeister, Thiere Brasiliens*, p. 42 (1854); *Wagner, Suppl. Schreb. Säugeth.* i. p. 397 (1844), v. p. 624 (1855); *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 47, pl. viii. fig. 8 (1855).

Phyllostoma maximus, *Wied, Reise nach Brasil.* ii. p. 242.

Head slightly raised above the face-line; muzzle obtusely conical, the distance between the eyes equals the distance between the eye and the end of the muzzle; ears shorter than the head (their extreme length, anteriorly, being exactly equal to the distance between the base of the tragus and the end of the muzzle), obtusely pointed;

inner margin of the ear-conch convex, the convexity decreasing upwards; upper half of the outer margin flatly emarginate, causing the tip of the ear to project slightly; lower half slightly convex; from the inner surface of the conch, near the anterior termination of the outer margin, arises parallel to the tragus a well-defined small square process, whereof the outer upper angle projects outwards; tragus much longer than wide, attenuated in upper third and subacutely pointed; inner margin convex below, concave above, lower third of the outer margin forming a square lobe (as in most other species of the subfamily) with projections at the lower and upper angles, about the middle of the outer margin a separate small pointed process, above which there is an obtuse angular projection from which the outer margin slopes upwards and inwards to form the tip; nose-leaf near the extremity of the muzzle, surrounded by glandular elevations less developed immediately in front and behind; horizontal leaf circular, having the uncovered nasal apertures opening in the centre, from between which the base of the erect posterior leaf arises; posterior erect leaf ovate, acuminate, in its widest part not quite equalling the width of the horseshoe, with a prominent longitudinal ridge; margin of the horseshoe separated from the muzzle laterally and in front; lower lip with a wide groove in front, margined on either side by nine small warts, whereof the two upper and inner are larger (Plate XXV. fig. 3, head).

In males the circular opening of a glandular sac exists in the inferior surface of the neck, slightly in front of the anterior extremity of the sternum; in females, a small rudimentary orifice alone is found.

Wing-membrane extending to the ankles; tail short, of five vertebræ, included in the base of the large interfemoral membrane, and projecting very slightly on its upper surface; calcaneum one third longer than the foot.

On the upper surface the fur covers half the forearm, and the base of the interfemoral membrane as far as the point of exit of the tail; the remaining parts of the membranes and extremities are quite naked; beneath, a very few fine hairs appear upon the antebrachial membranes and upon the wing-membrane near the body. The fur covering the body and head is moderately long and dense, and covers the face as far forwards as the posterior margin of the nose-leaf.

Above, dark greyish or reddish brown; paler beneath: or brilliant chestnut-brown above, slightly paler beneath.

Frontals flattened between the orbits; no postorbital processes; crown of the skull slightly and gradually raised above the face-line, with a well-defined sagittal crest, mastoid and paroccipital processes forming large flattened projections; basisphenoid deeply excavated on each side behind the commencement of the mesopterygoid fossa; bony palate not extending quite so far back as the middle of the slender zygomata.

Middle upper incisors moderately large, with broad oblique

cusps directed forwards, downwards, and inwards, with chisel-shaped unnotched cutting-edges, their inner margins close together; outer incisor on each side very small, not equalling the cingulum of the inner incisor in vertical extent, and occupying the narrow space between the inner incisor and the canine; lower incisors equal, symmetrical, chisel-shaped; first upper premolar with an oblique cusp, directed forwards and slightly inwards, touching the base of the canine; second upper premolar much larger, unicuspidate; last upper molar somewhat less than half the antepenultimate molar; first lower premolar triangular, nearly equalling the second in vertical extent, and exceeding it and the canine in cross section at the base; first and second molars equal, last molar three fourths the antepenultimate molar.

(For measurements see Table, p. 488.)

Hab. Brazilian Subregion; Peru. Appears to be confined to the forest-clad districts of these countries. Living in hollow trees, and between the large leaves of different species of palms.

Next to *Vampyrus spectrum* this is the largest species of Bat inhabiting the Western Hemisphere, the length of the head and body being nearly four inches, while the forearm measures three and a quarter.

The stomach is a simple pouch with rather thin walls, the mucous membrane not thickened or arranged in folds as in *Vampyrus spectrum*. I found the stomach of a specimen dissected by me filled with the comminuted remains of insects.

This species, in common with *Vampyrus spectrum*, was long believed to be sanguivorous in its habits, and the Prince of Neuwied gives credit to the current accounts (*op. cit.*). It is very probable that most of the larger species of insectivorous Bats (like *Megaderma lyra*) occasionally feed on the smaller Bats and other small mammals.

a. ad., al.	Demerara.	Purchased.
b. ad. sk.	Cayenne.	Purchased.
c–e. ad. sks.	Para.	R. Graham, Esq. [P.].
f, g. ♂ & ♀ ad., al.	Para.	R. Graham, Esq. [P.].
h. ad. sk.	Pernambuco.	J. P. G. Smith, Esq. [P.].
i, j. ad. sks.	Rio Napo, Brazil.	Purchased.
k. ad. sk.	Brazil.	J. Chant, Esq. [P.].
l. ad. sk.	Brazil.	Purchased.
m–o. ad. sks.	Brazil.	Old Collection.
p. ad. sk.	South America.	Sir Everard Home [P.].
q. ad. sk.	South America.	Purchased.
r. ♂ ad., al.		Purchased.
s–v. ♂ & ♀ ad., al.		M. Lidth de Jeude [C.].
w. ad. sk.		Purchased.
x. ad. sk.		Zool. Soc. Coll.
y, z. ad. sk.		St. George Mivart, Esq. [P.].
a'. sk.	Upper Amazons.	

2. Phyllostoma discolor.

Phyllostoma discolor, *Wagner*, *Wiegm. Archiv*, 1843, p. 366.
Phyllostoma innominatum, *Tschudi*, *Fauna Peruana*, p. 62 (1844–46).
Phyllostoma angusticeps, *Gervais*, *Expéd. du Comte de Castelnau*, *Zoologie*, p. 47 (1855).

Much smaller than *Ph. hastatum*, from which it is distinguished by the following characters also:—Muzzle comparatively longer and narrower, and the glandular elevations surrounding the horizontal portion of the nose-leaf do not extend in front; ears much more broadly rounded off at the tip, the projection from the inner surface of the ear-conch near the termination of the outer margin of the ear rounded off, not square; calcaneum shorter than the foot. Gular sac as in *Ph. hastatum*.

Fur, above, reddish brown, paler on the head, the base of the hairs yellowish white; beneath, the whole neck and the greater part of the chest and abdomen pale brownish buff, the sides of the chest and abdomen much darker

Teeth as in *Ph. hastatum*.

(For measurements see Table, p. 488.)

Hab. Guianas; Brazil; Peru (as far as 10° S. lat.).

Specimens of this species, at first sight, resemble not full-grown examples of *Ph. hastatum*, but, on closer examination, the much narrower muzzle and the shortness of the calcaneum at once distinguish them.

a. ♂ ad., al.	Surinam.	Dr. Peters [E.].
b, *c*. ♂ ad., al.	Surinam.	Purchased.
d. ♂ ad., al.		Purchased.

3. Phyllostoma elongatum.

Phyllostoma elongatum, *Geoffroy*, *Ann. du Muséum*, xv. p. 182, pl. 9 (1810); *Wagner*, *Suppl. Schreb. Säugeth.* i. p. 396 (1844), v. p. 624 (1855); *Tschudi*, *Fauna Peruana*, p. 61 (1844–46).
Alectops ater, *Gray*, *P. Z. S.* 1866, p. 114 (woodcut of head).

Slightly larger than *Ph. discolor*, but much smaller than *Ph. hastatum*, and easily distinguished from both by the much greater length of the vertical nose-leaf, which is also narrower and more attenuated above; the ears are comparatively longer and much broader, and more rounded off above, owing to the much greater convexity of the upper half of the inner margin, the tragus is also more attenuated (Plate XXV. fig. 4, head). In all other respects, in the form of the muzzle, position and size of the gular sac, attachment of the wing-membrane, comparative measurements, &c., this species closely resembles *Ph. hastatum*.

(For measurements see Table, p. 488.)

Hab. Surinam; Brazil; Peru.

Type in the collection of the Paris Museum. The type of *Alectops ater*, Gray, is in the Hunterian Museum.

The following Table exhibits the measurements of the three species described above:—

	Ph. hastatum.	*Ph. discolor.*	*Ph. elongatum.*
Length, head and body	3·9	3·0	3·1
„ tail	0·7	0·5	0·8
„ head	1·45	1·2	1·2
„ ear	1·1	0·8	1·05
„ tragus	0·45	0·35	0·38
„ nose-leaf	0·6	0·5	0·7
Breadth of ditto (of horizontal portion)	0·4	0·3	0·35
Length, forearm	3·2	2·3	2·55
„ thumb	0·63	0·5	0·5
„ third finger, metacarpal	2·85	2·1	2·15
„ „ 1st phalanx	0·8	0·55	0·65
„ „ 2nd „	1·4	1·0	1·15
„ „ 3rd „	1·0	0·7	0·8
„ fourth finger, metacarpal	2·7	2·0	2·15
„ „ 1st phalanx	0·65	0·4	0·55
„ „ 2nd „	1·0	0·75	0·8
„ fifth finger, metacarpal	2·7	2·0	2·2
„ „ 1st phalanx	0·6	0·35	0·5
„ „ 2nd „	0·6	0·5	0·55
„ tibia	1·1	0·9	1·0
„ calcaneum	1·0	0·4	0·8
„ foot	0·75	0·5	0·6

12. TYLOSTOMA.

Tylostoma, *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 49 (1855).

Muzzle shorter than in *Phyllostoma*; horizontal portion of the nose-leaf well developed, free in front and on the sides, vertical part very long, lanceolate; ears large, separate; lower lip with a V-shaped space in front, margined by warts; wings as in *Phyllostoma*; wing-membrane extending almost to the base of the toes; interfemoral very large, extending beyond the feet.

Dentition. Inc. $\frac{4}{2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{2-2}{2-2}$.

The first upper premolar small, with a straight cusp.

Range. Brazilian Subregion.

This genus resembles *Phyllostoma* in the relative proportion of the bones of the fingers and in the number of the back teeth; but the muzzle in both the known species is comparatively much shorter, the teeth are differently shaped and more crowded in the jaws, the general structure of the nasal appendages is different, and there is no glandular gular sac in either of the sexes.

In the form and arrangement of the chin-warts, and in the number of the lower incisors, *Tylostoma* appears to occupy a position with regard to *Phyllostoma* similar to that of *Lophostoma* to *Vampyrus*.

Synopsis of the Species.

a. Lancet-shaped nose-leaf notched along the sides; calcaneum shorter than the tibia .. 1. *T. crenulatum*, p. 489.
b. Lancet-shaped nose-leaf with an entire margin; calcaneum longer than the tibia .... 2. *T. longifolium*, p. 490.

1. Tylostoma crenulatum.

Phyllostoma crenulatum, *Geoffroy, Ann. du Mus.* xv. p. 183, pl. x. (1810).
Tylostoma crenulatum, *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 49, pl. viii. fig. 9 (1855).

Crown of the head moderately elevated above the face-line; muzzle shortly cylindrical, obtuse in front, the distance from the eye to the end of the muzzle is slightly less than the width of the space between the eyes; ears longer than the head, separate; ear-conch oval, with a short rounded-off tip, lower half of the inner margin strongly convex, then slightly concave, and again convex above; outer margin straight or faintly convex, slightly notched opposite the base of the tragus, beyond which it terminates in a convex lobe; tragus very narrow in upper third and acutely pointed, inner margin slightly convex, outer with two narrow and very prominent projections below; nose-leaf large, equal to three fourths the ear in length; nostrils opening by oblique slits in the centre of the horseshoe-shaped membrane, which has a thin free margin anteriorly and laterally, and is bent up on either side opposite the nasal apertures; erect posterior leaf lanceolate, broadest at the base, with a narrow rounded longitudinal central ridge extending from between the nostrils to the extremity of the leaf, and, laterally, at its junction with the horizontal leaf on either side, with a rounded lobule, succeeded by a notch, above which the margin of the lancet is finely crenulate and fringed with straight hairs; lower lip and chin with a naked V-shaped space in front, margined on the sides by transverse warts (Plate XXV. fig. 5).

Thumb short, not so long as the foot, which also is small; first phalanx of the middle finger about one third the metacarpal bone; tibia long and slender; calcaneum slender, nearly as long as the tibia; interfemoral membrane large, extending, when expanded, beyond the feet, its free margin between the extremities of the long calcanea straight; tail extending almost to the middle of the membrane, slightly beyond a line drawn between the knees, and appearing by its extreme tip upon its upper surface. Wing-membrane extending almost to the base of the toes.

Fur dark brown above, somewhat paler beneath, scarcely extending upon the membranes.

Upper middle incisors unicuspidate, conical, inclined slightly inwards; outer incisors very small, also conical; first upper premolar with a vertically directed cusp, small, about the size of one of the outer upper incisors; second premolar nearly equal to the canine in cross section at the base, but about half its size in vertical extent; molars

with well-developed W-shaped cusps, the last molar half the antero-posterior diameter of the antepenultimate molar; the two lower incisors small, with broad straight cutting-edges; first lower premolar equal to or exceeding the second in cross section at the base, but less than it in vertical extent. Premolars and molars in both jaws very close together, their vertical extent in relation to their antero-posterior diameter at the base much greater than in *Phyllostoma hastatum*.

(For measurements see p. 491.)

Hab. Suriman; Brazil.

This species is easily distinguished from all other known species of Phyllostomidæ by the peculiar toothed and crenulated condition of the margins of the erect nose-leaf.

In the mouth and throat of a specimen preserved in alcohol, in the Collection, I found portions of some small Coleopterous insects.

a. ♂ ? ad., al.	Surinam.	Mr. Bartlett [C.].

2. Tylostoma longifolium.

Phyllostoma longifolium, *Wagner, Wiegm. Archiv*, 1843, p. 365; *Abhandl. Münch. Akad.* v. p. 163, pl. ii. fig. 8.
Tylostoma longifolium, *Peters, MB. Akad. Berl.* 1866, p. 398.

Ears large, as in *T. crenulatum*, more rounded off above; nose-leaf similar in size, but the margin of the lancet-shaped portion is entire from the tip downwards as far as a small emargination immediately above its base, beneath which a tooth-like process occurs, on the posterior side of which the posterior margin of the horseshoe-shaped membrane is fastened; the central longitudinal ridge of the lancet is much developed; on either side at its base, at the inner margins of the nasal apertures, valve-like covering processes occur; horseshoe-shaped membrane as in *T. crenulatum*; lower lip with a large wart in the centre of a V-shaped double row of small transverse warts.

Wing-membrane from the metatarsus; calcaneum slightly longer than the tibia.

The hair of the body extends sparingly for a short distance only on the membranes, the proximal half of the humerus is clothed; the forearm, femur, and tibia are naked. Above, dark brown, with a pale-coloured spinal line; beneath, dirty yellow, the under surface of the jaws and sides of the neck bright reddish yellow.

Hab. Brazil (Mato Grosso).

The above description is taken from Dr. Peters's notes on the single type specimen preserved in the Vienna Museum, which I have not yet seen.

The following are the measurements of this species and of *T. crenulatum*:—

	T. crenulatum.	*T. longifolium.*
Length, head and body	2·1	...
,, tail	0·9	1·0
,, head	0·85	0·9
,, ear	1·0	0·9
,, tragus	0·4	0·35
,, nose-leaf	0·65	0·65
Breadth of ditto (horseshoe)	0·3	0·26
Length, forearm	1·9	1·9
,, thumb	0·35	0·4
,, third finger, metacarpal	1·65	1·7
,, ,, 1st phalanx	0·5	0·55
,, ,, 2nd ,,	0·85	1·0
,, ,, 3rd ,,	0·65	0·7
,, fourth finger, metacarpal	1·55	1·7
,, ,, 1st phalanx	0·4	0·45
,, ,, 2nd ,,	0·45	0·7
,, fifth finger, metacarpal	1·6	1·8
,, ,, 1st phalanx	0·4	0·4
,, ,, 2nd ,,	0·45	0·5
,, tibia	0·8	1·0
,, calcaneum	0·7	1·1
,, foot	0·4	0·45

In the type specimen of *T. crenulatum*, preserved in the Paris Museum, the forearm is 2″ and the tibia 0″·85, and the measurements of other parts slightly greater than those given above.

13. MIMON.

Mimon, *Gray, P. Z. S.* 1847, p. 14; *Ann. & Mag. Nat. Hist.* xix. p. 406 (1847).

Muzzle as in *Phyllostoma*; nasal appendages largely developed posteriorly, narrow in front; ears separate; chin with a broad naked space divided by a longitudinal groove; first phalanx of the middle finger nearly half the length of the metacarpal bone; wings from the ankles; tail distinct, terminating in the basal half of the large interfemoral membrane.

Dentition. Inc. $\frac{4}{2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$*, m. $\frac{3-3}{3-3}$.

This genus is evidently closely allied to *Phyllostoma*, from which it is mainly distinguished by the very different form of the chin-warts.

1. Mimon bennettii.

Phyllostoma bennettii, *Gray, Mag. Zool. & Bot.* ii. p. 488 (1838).
Mimon bennettii, *Gray, P. Z. S.* 1847, p. 14; *Ann. & Mag. Nat. Hist.* xix. p. 406 (1847); *Peters, MB. Akad. Berl.* 1866, p. 674.
Vampirus auricularis, *Saussure, Rev. et Mag. Zool.* xii. p. 487 (1860).

Ears large; general outline of the ear-conch triangular, the outer

* See remarks on the number of premolars in *M. bennettii*, p. 492.

and inner margins decreasingly convex upwards, very narrowly rounded off above; tragus as in *Phyllostoma hastatum*, but longer and more attenuated above; horizontal nose-leaf very similar to that of *Macrophyllum neuwiedii*, rather narrow and square in front and bound down to the upper lip, the vertical leaf as broad as it in the centre, quite equal in length to double its width, lanceolate, attenuated in upper third, with a central ridge forming the narrow terminal projection above; chin with a transverse naked space in front, divided in the centre by a narrow groove (Plate XXV. fig. 6).

Wings from the ankles or tarsus; calcaneum as long or slightly longer than the tibia; interfemoral membrane very deep, extending, when fully stretched, behind the feet; tail short, as in *Phyllostoma hastatum*.

Fur above cinnamon-brown, paler beneath; on both surfaces long and dense, covering the humerus, but scarcely extending to the membranes.

Central upper incisors moderately long, unicuspidate, chisel-shaped, directed vertically downwards; outer incisors very short, scarcely raised above the gum; lower incisors small, grooved in front and above; upper premolars as in *Phyllostoma*, lower equal in cross section at base, but the first is shorter and more obtuse.

Length, head and body about 2″·6, tail 1″·5, ear 1″·1, tragus 0″·4, thumb 0″·45; third finger—metacarp. 1″·7, 1st ph. 0″·8, 2nd ph. 1″, 3rd ph. 0″·7; fourth finger—metacarp. 1″·65, 1st ph. 0″·6, 2nd ph. 0″·7; fifth finger—metacarp. 1″·8, 1st ph. 0″·6, 2nd ph. 0″·65; tibia 0″·75, calcaneum 0″·8, foot 0″·65.

Hab. Mexico; South America.

This species is founded on a single specimen, a skin in bad condition, of which the greater part of the skull has been removed, and the lower jaw is broken across in the middle, so that it is doubtful whether a minute second premolar does not exist.

a. ad. sk. (type). South America.

14. CAROLLIA.

Carollia, *Gray, Mag. Zool. & Bot.* ii. p. 488 (1838); *Voyage of the 'Sulphur,' Mammalia*, p. 17 (1844); *Peters, MB. Akad. Berlin*, 1865, p. 519.

Hemiderma, *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 43 (1855).

Muzzle narrow, conical; crown of the head slightly elevated; nose-leaf as in *Schizostoma*, its anterior margin close to the upper lip; ears moderate; chin with a large wart in the centre of a V-shaped groove margined by warts; first phalanx of the middle finger nearly half the length of the metacarpal bone; interfemoral membrane well developed; tail short, in the base of the membrane as in *Phyllostoma*; feet free.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Molars narrow; the angles of the W-formed cusps very obtuse,

the basal projections on the inner sides of the upper molars feebly developed, with a single tubercle only, so that these teeth are triangular in cross section at the base. Skull wider between the post-orbital fossæ than across the anterior extremities of the nasal bones. Zygomatic arches deficient. (See Plate XXVI. figs. 5, 5*a*.)

1. Carollia brevicauda.

Phyllostoma brevicaudum, *Wied, Schinz, Thierreich*, i. p. 164 (1821); *Wied, Beitr. zur Naturgesch. Brasil.* ii. p. 192 (1825); *Wagner, Suppl. Schreb. Säugeth.* i. p. 401 (1844), v. p. 626 (1855); *Burmeister, Thiere Brasil.* p. 41 (1854).

Vampyrus soricinus, *Spix, Simiar. et Vespert. Brasil.* p. 66, pl. xxxvi. figs. ii. & vi. (1823).

Phyllostoma grayi, *Waterhouse, Voy. 'Beagle,' Mammalia*, p. 3, pl. ii. (1839).

Phyllostoma lanceolatum (*Natterer*), *Temminck, Gray, List Mammalia Brit. Mus.* p. 20 (1843).

Phyllostoma bicolor, *Wagner, op. cit.* i. p. 400 (1844), v. p. 626 (1855).

Carollia verrucata, *Gray, Voy. 'Sulphur,' Mammalia*, p. 20, pl. viii. fig. 3 (1844).

Phyllostoma calcaratum, *Wagner, Abh. Münch. Akad.* v. p. 168.

Phyllostoma brachyotum, *Burmeister, op. cit.* p. 46 (1854) (vide *Peters, MB. Akad. Berlin*, 1865, p. 519, note).

Hemiderma brevicaudum, *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 43, pl. vii. fig. 4, pl. ix. figs. 8, 8*a* (1855).

Carollia azteca, *Saussure, Revue et Mag. Zool.* xii. p. 480, pl. xx. figs. 1, 1*a* (1860).

Carollia brevicauda, *Peters, l. c.**

Rhinops minor, *Gray, P. Z. S.* 1866, p. 115.

Head slightly raised above the face-line, forehead flat; muzzle conical, the distance between the eyes is equal to the distance from the eye to the end of the muzzle; nose-leaf at the extremity of the muzzle, the front margin continuous with the upper lip; terminal erect leaf ovate, acuminate, arising, as in *Phyllostoma*, between the nasal apertures, the centre of the leaf slightly raised, but not forming a longitudinal ridge; ears separate, much shorter than the head, the upper third of the outer margin concave, the lower two thirds gradually convex; tragus as in *Phyllostoma hastatum*, a prominent ridge, directed upwards and inwards, in front of the base of its inner margin; lower lip with a central wart, and on either side a longitudinal elevation, divided by grooves into oblong warts, forming a triangle.

Wings from the ankles; interfemoral membrane rather deep, angularly emarginate in a line with the commencement of the distal third of the tibia; tail short, contained, as in *Phyllostoma*, in the base of the membrane; calcaneum short, equal to half the foot in length.

Fur moderately long and dense, dark brown above and beneath,

* The synonymy of this species has been well worked out by Dr. Peters in his paper on the group *Vampyri* referred to above.

on the upper surface extending upon the wing-membrane nearly as far as a line drawn from the middle of the humerus to the knee; a few fine very short hairs appear upon the fleshy part of the forearm; the legs and the interfemoral membrane behind the extremity of the tail are naked; beneath, the membranes are almost quite naked.

Upper inner incisors unicuspidate, converging inwards and touching by their extremities; outer incisors very small; lower incisors small, with notched crowns, the middle incisors broader than the outer ones: first upper premolar nearly equal to the second in cross section, and much exceeding it in vertical extent; its anterior margin convex, touching the canine; its posterior margin concave, separated by a considerable interval from the short cusp of the second premolar: first and second upper molars nearly equal, with small internal horizontal basal projections much less developed than in *Phyllostoma*, and narrow W-shaped cusps with obtuse inner angles; last upper molar small, triangular in cross section, scarcely one third the size of the second molar, placed on the root of the zygomatic process; lower premolars nearly equal in vertical extent and in cross section; molars rather narrow, progressively slightly smaller from before backwards.

Skull comparatively longer than in *Phyllostoma hastatum*, and more narrowed in front. Zygomatic arch deficient, represented by a small process of the maxillary bone in front and by a corresponding process of the temporal bone behind (Plate XXVI. figs. 5, 5*a*).

Length, head and body 2″, tail 0″·5, interfemoral membrane in the centre 0″·9, head 0″·9, ear 0″·75, tragus 0″·25, forearm 1″·6, thumb 0″·5; third finger—metacarp. 1″·45, 1st ph. 0″·7, 2nd ph. 0″·85, 3rd ph. 0″·5; fourth finger—metacarp. 1″·4, 1st ph. 0″·5, 2nd ph. 0″·5; fifth finger—metacarp. 1″·45, 1st ph. 0″·5, 2nd ph. 0″·5; tibia 0″·6, calcaneum 0″·3, foot 0″·5.

Hab. Neotropical Region, apparently generally distributed from Mexico to Sta. Catherina in Southern Brazil, and throughout the West Indian Islands.

This species forms a connecting link between the groups *Vampyri* and *Glossophagæ*, resembling many of the species of the latter group (especially those of the genus *Phyllonycteris*) in the narrowness of the molars and in the imperfect zygomatic arches. So closely does it resemble *Glossophaga soricina* externally that it has often been confounded with that species.

a. ♀ ad., al.	Jamaica.	Dr. A. Smith [P.].
b. ♀ ad., al.	Isle of Grenada.	Purchased.
c. ad. sk.	Mexico.	M. Sallé [C.].
d, e. ad. sks.	Central America.	Dr. J. E. Gray [P.].
f. ♂ ad., al.	Columbia.	Mr. Brandt [C.].
g–j. ad. sks.	Bolivia.	Mr. Bridges [C.].
k. ad. sk.	Rio Napo.	Purchased.
l. ad. sk.	Ega, Amazons.	H. W. Bates, Esq. [C.].
m. ad. sk.	Pernambuco.	J. P. G. Smith, Esq. [P.].
n–q. ♂ & ♀ imm. et ad., al.	Pernambuco.	J. P. G. Smith, Esq. [P.].
r. ♀ ad., al.	Para.	Purchased.
s. ♀ ad., al.	Rio Janeiro.	G. Busk, Esq. [P.].

t–*b'*. imm. et ad. sks.	Bahia.	Comte de Castelnau [P.].
c'. ad. sk.	Bahia.	Comte de Castelnau [P.].
(Type of *Rhinops minor*, Gray.)		
d', *e'*. ad. sks.	Sta. Catherina.	E. I. House Coll.
f', *g'*. ♂ & ♀ ad., al.	Brazil.	T. Bell, Esq. [P.].
h'. ad. sk.	Brazil.	Purchased.
i', *j'*. ♂ ad., al.	Brazil.	
k'. ad. sk.	Brazil.	Purchased.
l'. ad. sk.	Minas Geraes.	Purchased.
m'–*q'*. ♂ & ♀ juv. et ad.		M. Lidth de Jeude.
r'. ♀ ad., al.	No history.	
s'. ad. sk.		Leyden Museum.
t'–*v'*. ad. sks.	No history.	
w'. ad. sk.		Old Collection.
(Type of *Carollia verrucata*, Gray.)		
x'. ad. sk.		Purchased.
y'. skeleton.	Pernambuco.	J. P. G. Smith, Esq. [P.].
z'–*b''*. skulls of *g*, *h*, *i*.		
c''. skull of *t*.		
d''. skull of *l'*.		

15. RHINOPHYLLA.

Rhinophylla, *Peters, MB. Akad. Berl.* 1865, pp. 355, 520.

Ears and nasal appendages as in *Carollia*; muzzle shorter; crown of the head slightly elevated; chin with a central wart surrounded by other warts; wings as in *Carollia*, but the wing-membrane extends to the metatarsus; tail none.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Molars narrower than in *Carollia*, without distinct W-shaped cusps, and without horizontal projections from the inner sides of their bases.

1. Rhinophylla pumilio.

Rhinophylla pumilio, *Peters, MB. Akad. Berl.* 1865, pp. 355, 521.

Crown of the head slightly raised above the face-line; muzzle obtusely conical, the distance between the eyes is equal to the distance from the eye to the extremity of the muzzle; front edge of the horseshoe-shaped leaf continuous with the upper lip, the erect ovate-lanceolate leaf twice as long as the horseshoe, narrowed in upper third and acutely pointed, the centre slightly raised, but not forming a longitudinal ridge; ears separate, much shorter than the head, the upper third of the outer side of the ear-conch deeply emarginate, the lower two thirds convex, the convexity commencing abruptly; tragus as in *Carollia brevicauda*, and from the base of its inner margin a similar raised ridge extends upwards and forwards as in that species; chin with a central wart and a larger longitudinal wart on either side, forming a triangle, at the apex of which beneath a single small wart is placed.

Wings from the metatarsus, extending almost to the base of the

toes; interfemoral membrane angularly emarginate, extending almost as far back as the middle of the tibiæ; calcaneum short, not exceeding half the foot in length.

The fur covers the fleshy part of the forearm, and extends upon the wing-membrane almost as far as a line drawn from the elbow to the distal third of the femur, a few fine hairs appear upon the interfemoral membrane and upon the legs and backs of the feet; beneath, the membranes are almost naked.

Upper inner incisors converging inwards, and touching by their inner extremities, their summits broad and very distinctly notched; outer incisors minute; lower incisors unequal, the two middle much wider and somewhat longer than those next the canines, which are very small, with oblique summits directed upwards and inwards, the middle pair distinctly trifid (Plate XXVII. fig. 1); first upper premolar in the tooth-row very small, cylindrical, with a flat circular crown, smaller than the last upper molar, which is also cylindrical and scarcely raised above the gum; second upper premolar narrow, with a triangular crown, equal to the first molar in cross section at the base; the first molar narrow, much longer than broad, slightly exceeding the second in vertical extent, without W-shaped cusps, and without an internal basal projection; second upper molar similar, but smaller; last upper molar very small, cylindrical, close behind the second molar; lower premolars nearly equal in size, with broadly triangular summits; molars very narrow, with a single central triangular cusp and an anterior and posterior basal projection; last molar slightly smaller than the antepenultimate molar (Plate XXVII. figs. 1 *a*, 1 *b*).

Skull shortly and obtusely conical in front, the width across the nasal bones less than between the temporal fossæ; brain-case but slightly vaulted and raised above the face-line.

Length, head and body 1″·8, interfemoral membrane in the middle 0″·3, head 0″·7, ear 0″·6, tragus 0″·25, nose-leaf 0″·35 × 0″·2, forearm 1″·25, thumb 0″·35; third finger—metacarp. 1″·15, 1st ph. 0″·55, 2nd ph. 0″·7, 3rd ph. 0″·5; fourth finger—metacarp. 1″·15, 1st ph. 0″·45, 2nd ph. 0″·45; fifth finger—metacarp. 1″·2, 1st ph. 0″·35, 2nd ph. 0″·35; tibia 0″·4, calcaneum 0″·15, foot 0″·35.

Hab. Brazil (Bahia).

This species connects the *Vampyri* with the *Glossophagæ* and with the *Sternodermata*, resembling the species of the former group in the narrow molars and in the form of the nose-leaf, those of the latter in the form and arrangement of the chin-warts, in the shape of the ears, in the presence of a very prominent cutaneous ridge extending upwards and outwards from the base of the inner margin of the tragus, in the small circular last upper molar, and in the absence of the tail. It is the smallest species of *Phyllostomidæ* known, the forearm being shorter than in either *Artibeus cinereus* or *A. quadrivittatus*, which otherwise it approaches in size.

a. ♂ ad., al. Bahia. G. E. Dobson, M.B. [E.].

Group 2. GLOSSOPHAGÆ.

Glossophagæ, *Peters, MB. Akad. Berl.* 1865, p. 257, 1868, p. 361.

Muzzle long and narrow; tongue remarkably long and extensible, much attenuated towards the tip, the sides or upper surface near the tip with long filiform recurved papillæ; lower lip with a wide groove above and in front margined by small warts; nose-leaf small, the horizontal portion scarcely developed in front of the nasal apertures, which open above, near the extremity of the muzzle; tail short or none.

Dentition. Inc. $\frac{4}{4}$ or $\frac{2-2}{2-2}$, pm. $\frac{2-2}{3-3}$ or $\frac{3-3}{3-3}$ or $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$ or $\frac{2-2}{3-3}$ or $\frac{2-2}{2-2}$.

Premolars and molars very narrow, their antero-posterior much exceeding their transverse diameter; molars with narrow W-shaped cusps, which are sometimes indistinct or absent; lower incisors very small or deciduous.

Range. Tropical parts of the Neotropical Region.

The species of this group are at once distinguished from all other species of *Phyllostomidæ* by their long and much attenuated tongue clothed with filiform papillæ, and by the deep groove in the upper surface of the centre of the lower lip. In other respects the typical species, *Glossophaga soricina*, so closely resembles *Carollia brevicauda*, both in external form and in dentition, that it has not unfrequently been confounded with that species, which must therefore, as well as *Rhinophylla pumilio*, be regarded as connecting links between the *Vampyri* and the *Glossophagæ*.

The only other Bats possessing similarly long tongues beset with filiform papillæ are the frugivorous *Macroglossi*, belonging to the widely removed family *Pteropodidæ*; and, judging from analogy, we should expect to find that the *Glossophagæ* were, like the *Macroglossi*, frugivorous in their habits, while the form of their teeth would lead us to suppose that they were also insectivorous. That these views are correct appears to be shown by the observations of Mr. W. Osburn* and by those of the Prince of Neuwied†. The former found that *Phyllonycteris sezekorni* feeds on the bread-fruit and on berries of *Cordia collococca*, with the *débris* of which the floors of the caves inhabited by this species were thickly strewn; the latter discovered remains of insects in the stomachs of *Glossophaga soricina* and of *Lonchoglossa wiedii*.

It is probable that the species with well-developed interfemoral membrane (as *Glossophaga soricina* and *Chæronycteris mexicana*) are chiefly insectivorous, while those in which the membrane is small or quite rudimentary feed principally on fruit.

The ten species included in this group represent seven genera, which are distinguished principally by differences in the form and number of the teeth, and by the presence or absence of the zygomatic arches. The form and position of the upper incisors are extremely variable. In *Glossophaga* and *Phyllonycteris* the upper incisors form, as in the *Vampyri*, a continuous row between the canines; in

* P. Z. S. 1865, p. 83. † Beitr. zur Naturgesch. Brasil. ii. pp. 212, 217.

Monophyllus and *Ischnoglossa* they are separated into pairs by a narrow interval in front; while in *Lonchoglossa*, *Glossonycteris*, and *Chœronycteris* they are widely separated and placed in pairs near the canines: in the first four genera the lower incisors are present (at least up to a certain age), in the latter three they are deciduous even in youth. The zygomatic arch is undeveloped in *Phyllonycteris* (which agrees with *Carollia* in this respect as well as in dentition), in *Glossonycteris*, and in *Chœronycteris*.

Synopsis of the Genera.

a. Molars with more or less distinct W-shaped cusps.
  a'. Inner upper incisors larger than the outer ones.
    a''. Upper incisors in a row between the canines.
      a'''. Zygomatic arch complete; interfemoral membrane well developed; premolars $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$ ..... 16. GLOSSOPHAGA, [p. 499.
      b'''. Zygomatic arch undeveloped; interfemoral membrane very narrow; premolars $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$ ..... 17. PHYLLONYCTERIS, [p. 501.
    b''. Upper incisors in pairs, separated by a small space.
      c'''. Zygomatic arch complete; tail extending beyond the narrow interfemoral membrane; premolars $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$ ..... 18. MONOPHYLLUS, [p. 503.
      d'''. Zygomatic arch complete; no tail; interfemoral membrane very narrow; premolars $\frac{2-2}{3-3}$, m. $\frac{2-2}{2-2}$ ..... 19. ISCHNOGLOSSA, [p. 505.
  b'. Inner upper incisors smaller than the outer ones.
    b''. Upper incisors in pairs, separated by a wide space.
      e'''. Zygomatic arch complete; premolars $\frac{3-3}{3-3}$, m. $\frac{3-3}{3-3}$; tail and interfemoral membrane very short ..... 20. LONCHOGLOSSA, [p. 506.
      f'''. Zygomatic arch undeveloped; premolars $\frac{3-3}{3-3}$, m. $\frac{3-3}{3-3}$ ..... 21. GLOSSONYCTERIS, [p. 508.
b. Molars very narrow, without distinct W-shaped cusps.
  b'. Inner upper incisors smaller than the outer ones.
    b''. Inner upper incisors in pairs, separated by a wide space.
      g'''. Zygomatic arch undeveloped; premolars $\frac{3-3}{3-3}$, m. $\frac{3-3}{3-3}$; first upper premolar deciduous; tail short; interfemoral membrane well developed .. 22. CHŒRONYCTERIS, [p. 509.

16. GLOSSOPHAGA.

Glossophaga, *Geoffroy* (in part), *Mém. du Muséum*, iv. p. 411 (1818); *Tschudi, Fauna Peruana*, p. 69 (1844–46); *Burmeister* (in part), *Thiere Brasiliens*, p. 52 (1854); *Peters, MB. Akad. Berl.* 1868 p. 362.

Phyllophora *et* Glossophaga, *Gray, Mag. Zool. & Bot.* ii. pp. 489, 490 (1838).

Nicon, *Gray, Ann. & Mag. Nat. Hist.* xix. p. 407 (1847).

Muzzle moderately long; erect portion of the nose-leaf well developed; tongue with long filiform papillæ on the sides; interfemoral membrane large; calcaneum and tail distinct, the latter terminating on the upper surface of the membrane.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

Upper and lower incisors forming a continuous semicircular row between the canines; the inner upper incisors larger and broader than the outer ones; molars with distinct W-shaped cusps.

Skull moderately long, with well-developed zygomatic arches.

1. Glossophaga soricina.

Vespertilio soricinus, *Pallas, Miscell. Zoolog.* p. 48, pl. iv. figs. 16–18, and pl. v. (1766); *Spicileg. Zoolog.* iii. p. 24, pls. iii., iv. (1767); *Schreber, Säugeth.* i. p. 161, pl. xlvii. (1775).

Phyllostoma soricinum, *Geoffroy, Ann. du Muséum*, xv. p. 179, pl. xi. (1810).

Glossophaga soricina *et* amplexicaudata, *Geoffroy, Mém. du Muséum*, iv. p. 418, pl. xviii. (1818); *Wagner, Suppl. Schreb. Säugeth.* i. pp. 387, 390, v. pp. 617, 618.

Glossophaga amplexicaudata, *Spix, Simiar. et Vespert. Brasil.* p. 66, pl. xxxvi. fig. iv. (1823); *Wied, Beitr. zur Naturg. Brasil.* p. 208 (1826); *Tschudi, Fauna Peruana*, p. 69 (1844–46).

Phyllophora amplexicaudata *et* Glossophaga soricina, *Gray, Mag. Zool. & Bot.* ii. p. 490 (1838).

Phyllophora nigra, *Gray, Voy. 'Sulphur,'* p. 18, pl. v. fig. i. (1844).

Monophyllus leachii, *Gray, Voy. 'Sulphur,' Mammalia*, p. 18 (1844).

Nicon caudifer, *Gray, Ann. & Mag. Nat. Hist.* xix. p. 407 (1847).

Phyllophora amplexicaudata, *Gervais, Expéd. du Comte de Castelnau, Zoolog.* p. 40, pl. viii. figs. 1, 1 *a*, 1 *b*, pl. ix. fig. 9 (1855).

Glossophaga soricina, *Peters, MB. Akad. Berl.* 1865, p. 352, 1868, p. 362.

Muzzle narrow and elongated, the distance between the eyes is equal to three fourths the distance between the eye and the end of the muzzle: ears short and broad, much shorter than the head, broadly rounded off; inner margin of the ear-conch strongly convex, outer straight in upper two thirds, in lower third slightly convex: tragus triangular, acutely pointed as in *Rhinophylla*: nose-leaf at the extremity of the muzzle; the horizontal portion very narrow in front, slightly broader than the erect leaf, which is ovate-acuminate and slightly concave on the sides towards the extremity; no central

longitudinal ridge; tongue very long, much attenuated in its terminal fourth, and flattened, the centre naked above and beneath, the sides set with long filiform papillæ directed backwards; lower lip widely grooved above and also in front, the edges of the groove margined with small warts.

Thumb well developed, with a large claw; first phalanx of the middle finger less than half the length of the metacarpal bone; wings from the ankles; calcaneum half the length of the foot; interfemoral membrane concave behind, extending as far back in the middle line as the centre of the tibia; tail very short, the extreme tip appearing upon the upper surface of the membrane.

Fur, above, dark brown, paler towards the base of the hairs; beneath, similar, but paler; moderately long, scarcely extending upon the volar membranes, but the metacarpal bone of the thumb is clothed with short hairs; the face is covered to the extremity of the muzzle with short fur, and several single, fine, long hairs spring from the muzzle in front of the eyes and behind the chin.

Upper incisors in a semicircular row between the canines, all close together; the central pair chisel-shaped, larger than the outer ones, which have oblique cusps slanting downwards and inwards; lower incisors equal, cylindrical, flat-crowned, in a convex row (Plate XXVII. fig. 2); upper canines with a projecting cingulum behind; upper premolars narrow, triangular, nearly equal; the first premolar separated from the canine by a small interspace, the remaining teeth close together; first and second upper molars almost equal, with narrow W-shaped cusps, and horizontal base projecting inwards; last upper molar three fourths the antepenultimate molar; lower premolars equal in size as in upper jaw; molars narrow, with blunt cusps.

Length (of an adult ♀), head and body 2″, tail 0″·3, interfemoral membrane in the middle 0″·6, head 0″·8, eye from end of muzzle 0″·3, ear 0″·55, tragus 0″·2, nose-leaf 0″·25, forearm 1″·35, thumb 0″·3; third finger—metacarp. 1″·3, first ph. 0″·5, second ph. 0″·6, third ph. 0″·4; fourth finger—metacarp. 1″·2, first ph. 0″·4, second ph. 0″·4; fifth finger—metacarp. 1″·15, first ph. 0″·35, second ph. 0″·35; tibia 0″·45, calcaneum 0″·2, foot 0″·38.

Hab. Tropical parts of the Neotropical Region, probably generally distributed. In the Mexican, Brazilian, and Chilian Subregions, recorded from Mexico (Tehuantepec, Oaxaca), Guatemala (Coban), Costa Rica, Venezuela, Island of Trinidad, British Guiana, Surinam, Brazil, Upper Amazons, Peru, Bolivia; and in the Antillean Subregion, from Jamaica and the Isle of Grenada.

This species is so widely distributed and so abundant in the Neotropical Region, that examples of it are found in almost every collection made in the tropical parts of that region, and this has led to the very great list of synonyms which preface the description. The synonymy of this and of the other species of the group Glossophagæ has been most carefully worked out by Dr. Peters in his paper referred to above. The original description, published by Pallas more than one hundred years ago, leaves little to be desired;

it contains an excellent account of the visceral anatomy, illustrated by many well-executed figures.

a. ad. sk.	Jamaica.	P. H. Gosse, Esq. [C.].
b. ♂ ad., al.	Isle of Grenada.	Purchased.
c–e. ♂ & ♀ ad., al.	West Indies.	T. Bell, Esq. [P.].
f, g. ♂ ad., al.	Tehuantepec.	Purchased.
h. ad. sk.	Oaxaca.	M. Sallé [C.].
i, j. ♂ ad., al.	Oaxaca.	M. Sallé [C.].
k. ♂ imm., al.	Mexico.	
l, m. ♂ & ♀ imm. et ad., al.	Coban.	O. Salvin, Esq. [C.].
n, o. ♂ ad., al.	Costa Rica.	Purchased.
p, q. ♂ & ♀ ad., al.	Central America.	O. Salvin, Esq. [C.].
r. ad. sk.	Keelejo, C. America.	Purchased.
	(Type of *Monophyllus leachii*, Gray.)	
s, t. ad. sks.	Bolivia.	Mr. Bridges [C.].
u. ad. sk.	Santa Cruz, Haulhaja, Peruvian Amazons.	Mr. Bartlett [C.].
v. ♂ ad., al.	Upper Amazons.	Purchased.
w. ♂ ad., al.		Capt. Maryatt [C.].
x, y. ♂ ad., al.		M. Lidth de Jeude.
z. ♀ ad., al.	? Isle of St. Vincent.	
a'. ad. sk.		Purchased.
b'. skull of *r*.		

17. PHYLLONYCTERIS.

Phyllonycteris, *Gundlach et Peters, MB. Akad. Berl.* 1860, p. 817; *Peters, l. c.* 1868, p. 363.

Muzzle moderately long; erect portion of the nose-leaf very short; tongue as in *Glossophaga*; interfemoral membrane very narrow, exceeded in length in the middle by the short tail; calcaneum short or wanting.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Incisors as in *Glossophaga*; molars like those of *Carollia*, but the the W-shaped cusps scarcely developed.

Skull moderately long, without osseous zygomatic arches.

Synopsis of the Species.

a. Calcaneum none ..... 1. *Ph. poeyi*, p. 501.
b. Calcaneum short, but distinct* ..... 2. *Ph. sezekorni*, p. 502.

1. Phyllonycteris poeyi.

Phyllonycteris poeyi, *Gundlach et Peters, MB. Akad. Berl.* 1860, p. 817.

Much larger than *Glossophaga soricina*; nose-leaf very short, almost rounded off above. Ears, lower lip, and tongue as in *G. soricina*. Wing-membrane from the distal third of the tibia; interfemoral membrane very short, not extending as far as the terminal

* See remarks in footnote, p. 502.

fourth of the tibia; calcaneum none; tail very short, projecting by its last vertebra beyond the narrow interfemoral membrane.

Fur, above, light brownish yellow, paler on the neck and on the sides of the body, the base of the hairs and their extreme tips whitish; beneath, paler.

Teeth very similar to those of *Carollia brevicauda*; the hinder upper molar is proportionally larger, and the lower incisors are equal in size.

Length, head and body 3″·25, tail 0″·4, head 1″·05, ear 0″·7, tragus 0″·3, nose-leaf 0″·22 × 0″·18, forearm 1″·8, thumb 0″·5, third finger 3″·1, fourth finger 2″·4, fifth finger 2″·45, tibia 0″·95, foot 0″·65.

Hab. Cuba.

2. Phyllonycteris sezekorni.

Phyllonycteris sezekorni, *Gundlach et Peters*, *MB. Akad. Berl.* 1860, p. 818.

Phyllonycteris poeyi, *Tomes*, *P. Z. S.* 1861, p. 65 (vide *Peters*, *MB. Akad. Berl.* 1868, p. 364).

About the size of *Ph. poeyi*, and resembling that species closely in general structure and in the colour of the fur. It is distinguished by the different form of the nose-leaf, which terminates behind in a small pointed process, and by the presence of a small calcaneum, to which the narrow interfemoral membrane extends backwards along the leg.

Teeth as in *Ph. poeyi*.

Length, head and body 3″, tail 0″·5, head 1″, ear 0″·8, tragus 0″·3, nose-leaf 0″·2 × 0″·18, forearm 1″·95, thumb 0″·55, third finger 3″, fourth finger 2″·45, fifth finger 2″·5, tibia 0″·8, calcaneum 0″·05, foot 0″·6.

Hab. Cuba; Jamaica*.

Mr. Osburn, in notes on recently-killed specimens of this species, remarks (P. Z. S. 1865, p. 82) that the tongue narrows towards the tip more suddenly than in *Monophyllus redmani*, and that it is covered with reversed prickles, which are especially long and bristle-like on the edges of the tip.

A colony of this species, consisting of a great number of individuals, was discovered by Mr. Osburn in a cave near Trelawny, in Jamaica. The visit to the cave was made in the month of June, and the number of the sexes was found pretty equal. Most of the females had young, but in no case was more than one young one found with a single female. The floor of the cave was found

* The types of *Phyllonycteris poeyi* and *Ph. sezekorni* have not been examined by me. I am therefore obliged to follow the original descriptions by Dr. Gundlach, who, although noting such an important difference as the absence of the calcanea, yet appears doubtful whether *Ph. sezekorni* should really be considered a distinct species. It is certainly strange that such a remarkable structural difference should exist between two forms otherwise so very closely allied and inhabiting the same localities, and it seems very probable that the apparent absence of the calcaneum in the type of *Ph. poeyi* is the result of indifferent preservation. In two skulls sent by Mr. Osburn from Jamaica there are very slender fibro-cartilaginous zygomatic arches.

strewn with refuse from bread-fruit and clammy cherry (*Cordia collococca*).

Several individuals of this colony were obtained by Mr. Osburn, and fed by him in captivity on the fruits of the clammy cherry. Their mode of eating is thus described:—"The tongue was rapidly protruded and drawn in again, and the juice and softer pulp cleared away with great rapidity. I noticed he was very particular in cleaning out the bit of loose skin of berry, and licked my fingers of the juice spilt on them, carefully cleaning out any that had collected under the nail. I then got another berry. The Bat was hanging from the edge of the box, its ventral surface against the side; and as I held the berry a little off so as to see the action of the tongue, it had, whilst feeding, to bend the neck so as to raise the head a little: this seemed to fatigue it. It therefore raised itself on one wrist, and turned round so that its back was against the box's side; but as it did not change the position of the feet, of course the legs crossed, the right foot now being on the left side, and *vice versâ*. In this odd position it appeared perfectly at ease, and went on licking at a fresh berry with great relish. As the pulp and juice became exhausted I expected he would drop it, and was prepared with another berry; but, to my surprise, he brought up the wrists to the muzzle, took the berry between them, gave it two or three energetic bites, and then held the berry off. So I now understood what the unusually long thumbs were for; for they applied themselves dexterously to the berry, held it firmly, and then, as it appeared to me, by a reverse action of the two wrists the berry was turned round, a fresh hold taken by the teeth, and the same licking-process renewed till the seed in the centre was cleaned of the pulp, all but the little bit which served for the last tooth-hold. It was then dropped, and the eager little muzzle raised for more.

"I then took them and put them among the twigs of *Cordia*. They climbed about it, heads downwards, with the greatest ease. The length of the legs and toes, their muscularity, and the absence of any interfemoral were all obvious advantages where this habit was constant, especially the power it gave them of turning as on a pivot, but without moving the feet"*.

18. MONOPHYLLUS.

Monophyllus, *Leach*, *Trans. Linn. Soc.* xiii. p. 75; *Tomes*, *P. Z. S.* 1861, p. 91; *Peters*, *MB. Akad. Berl.* 1868, p. 363.

Muzzle longer and broader in front than in *Glossophaga*; nose-leaf, ears, and tragus as in that genus; tongue longer and with filiform papillæ on its upper surface; interfemoral membrane short, exceeded in length by the tail; calcaneum rudimentary.

Dentition. Inc. $\frac{2-2}{2-2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{3-3}{3-3}$.

* The above is an abridgement of Mr. Osburn's most interesting notes, which are too long to quote here *in extenso*. Two skulls of specimens collected by him, referred to above, are preserved in the Zoological Museum at Cambridge.

Upper incisors in pairs, separated by a space, the inner incisors broader and larger than the outer ones; lower incisors very small; molars with narrow, but distinct, W-shaped cusps.

Skull longer than in *Glossophaga*, with well-developed zygomatic arches.

1. Monophyllus redmani.

Monophyllus redmani, *Leach*, *Trans. Linn. Soc.* xiii. p. 76 (1822); *Tomes*, *P. Z. S.* 1861, p. 91, pl. xv.

Muzzle longer and broader at the extremity than in *Glossophaga soricina*, but the nose-leaf is almost similar; ears short, inner margin of the ear-conch convex, tip rounded off; upper third of outer margin concave, lower two thirds convex; tragus as in *G. soricina*, but more obtuse; tongue long, suddenly narrowed, and rounded in terminal one fourth, with a small tuft of long papillæ on the upper surface at the tip, unlike that of *G. soricina*, which has the attenuated tongue flattened and set with long papillæ on the sides.

Thumb long and strong, but with a smaller claw than in *G. soricina*. First phalanx of the middle finger equal in length to one third the metacarpal bone. Wings from the middle of the tibia, or slightly lower down; feet large; tail short, *projecting by nearly half its length beyond the very narrow interfemoral membrane*; calcaneum rudimentary.

Fur, reddish brown above, beneath greyish brown, the extremities of the hairs grey; moderately long, scarcely extending upon the membranes; a few very short hairs appearing upon the forearm and legs; the end of the muzzle and chin with a few long, straight, fine hairs.

Upper incisors as in *G. soricina*, but smaller, and separated by an interval in the middle line (Plate XXVII. fig. 3); first upper premolar very narrow and long, with a central acute cusp, and a small basal cusp in front and behind, close to the canine, and separated from the second premolar by a space; second premolar similar, but thicker at the base behind, and the posterior basal cusp obtuse; molars with very narrow W-shaped cusps, the internal horizontal basal projection not wider than the outer side of the tooth; the last molar about three fourths the antepenultimate molar; lower incisors very small, in pairs on each side; lower premolars nearly equal in vertical extent, the third premolar thicker and slightly shorter than the second, which is similar to the first upper premolar.

Length (of an adult ♂), head and body 2″·4, tail 0″·5, head 0″·95, eye from end of muzzle 0″·35, ear 0″·55, tragus 0″·2, forearm 1″·65, thumb 0″·45; third finger—metacarp. 1″·5, 1st ph. 0″·5, 2nd ph. 0″·8, 3rd ph. 0″·5; fourth finger—metacarp. 1″·45, 1st ph. 0″·35, 2nd ph. 0″·55; fifth finger—metacarp. 1″·25, 1st ph. 0″·35, 2nd ph. 0″·5; tibia 0″·6, foot 0″·5.

Hab. Cuba; Jamaica.

This species may be at once distinguished by the tail, which projects to a distance equal to more than half the length of the thumb beyond the margin of the very short interfemoral membrane.

Specimens of this Bat were obtained by Mr. W. Osburn in caves in Jamaica, associated with other species of Bats, notably with *Chilonycteris parnellii* and *Mormops blainvillii*. Its habits appear to be similar to those of *Phyllonycteris sezekorni* (vide *antea*, p. 503, and Mr. Osburn's notes published in P. Z. S. 1865, pp. 69–72).

a. ad. sk. (type).	Jamaica.	J. S. Redman, Esq. [P.].
b. ad. sk.	Jamaica.	Capt. Hamilton [P.].
c. ♂ ad. sk.	Oxford Cave, Jamaica.	? W. Osburn, Esq. [P.].
d. skull of *a*.		

19. ISCHNOGLOSSA.

Ischnoglossa, *Saussure, Rev. et Mag. Zool.* xii. p. 492 (1860); *Peters, MB. Akad. Berl.* 1868, p. 363.

Muzzle and ears as in *Monophyllus*, nose-leaf less developed; interfemoral membrane very small; tail none, or exceedingly short.

Dentition. Inc. $\frac{2-2}{2-2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{2-2}{2-2}$.

Upper and lower incisors as in *Monophyllus*; molars narrow, with ill-defined W-shaped cusps. Skull with well-developed zygomatic arches.

1. Ischnoglossa nivalis.

Ischnoglossa nivalis, *Saussure, Rev. et Mag. Zool.* xii. p. 492, pl. xx. figs. 2–2*c* (1860); *Peters, MB. Akad. Berl.* 1868, p. 363, pl. figs. 1–1*e* (skull and teeth).

Much larger than *Monophyllus redmani*, the muzzle also proportionately longer and narrower; the ears are similar, but the nose-leaf is shorter and more obtuse.

First phalanx of the middle finger one third the length of the metacarpal bone; the metacarpal bones of the last three fingers progressively shorter.

Wings from the tibia near the ankle; calcaneum very short and feeble; interfemoral membrane narrow, the emargination extending above the knees; feet large, longer than the thumb; no trace of a tail externally.

Fur, above, dark brown, at the base almost white; beneath paler. The wings and interfemoral membranes on both surfaces are naked, or clothed thinly with fine, almost invisible, hairs.

Upper and lower incisors as in *M. redmani*; the first upper premolar long and narrow, separated by a space from the canine and also from the second premolar, with a central cusp and a small basal cusp in front and behind; second premolar similar, the posterior basal cusp scarcely developed; molars with ill-defined W-shaped cusps, much narrower than in *M. redmani*, the last molar shorter than the first. First lower premolar longer in antero-posterior diameter than the second, but less than it in vertical extent; second premolar separated from the first and third premolars by a space.

Length, head and body 3″·5, head 1″·15, ear 0″·65, tragus 0″·28, nose-leaf 0″·2, forearm 2″·2, thumb 0″·35, third finger—metacarp. 1″·9, 1st ph. 0″·65, 2nd ph. 1″, 3rd ph. 0″·55; fourth finger—metacarp. 1″·75, 1st ph. 0″·5, 2nd ph. 0″·75; fifth finger—metacarp. 1″·7, 1st ph. 0″·45, 2nd ph. 0″·6; tibia 0″·9, foot 0″·58.

Hab. Mexico (peak of Orizaba, near the snow-limit); Guatemala (Dueñas).

a. ad. sk., in al.	Dueñas, Guatemala.	O. Salvin, Esq. [C.].
b. imm. sk., in al.	Cuidad Vieja.	O. Salvin, Esq. [C.].

20. LONCHOGLOSSA.

Glossophaga, *Geoffroy* (in part), *Mém. du Muséum*, iv. p. 411 (1818); *Blainville, Ostéographie*, p. 34 (1839).
Monophyllus *et* Anoura, *Gray, Mag. Zool. & Bot.* ii. p. 490 (1838).
Lonchoglossa, *Peters, MB. Akad. Berl.* 1868, p. 364.

Muzzle longer than in *Monophyllus*, but ears and nose-leaf as in that genus; interfemoral membrane very short; calcaneum distinct; tail rudimentary or none.

Dentition. Inc. $\frac{2-2}{2-2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{3-3}{3-3}$.

Upper incisors in pairs, separated by a wide space, the inner incisors smaller than the outer ones, lower incisors deciduous; molars with very narrow W-shaped cusps; skull with complete zygomatic arches.

Synopsis of the Species.

a. Tail very short; interfemoral membrane nearly naked; forearm 1″·25 ..... 1. *L. caudifera*, p. 506.
b. Tail absent; interfemoral membrane well covered; forearm 1″·6 ..... 2. *L. wiedii*, p. 507.

1. Lonchoglossa caudifera.

Glossophaga caudifer *et* ecaudata, *Geoffroy, Mém. du Muséum*, iv. p. 418, pls. xvii. & xviii. fig. B (1818) (vide *Peters, MB. Akad. Berl.* 1868, p. 364).

Nose-leaf and ears as in *Monophyllus redmani*, the nose-leaf slightly shorter and more pointed, and the muzzle longer.

Thumb shorter than the foot, which equals three fourths the tibia in length. Wing-membrane extending to the distal extremity of the tibia. Tail very short, scarcely distinguishable in dried skins; interfemoral membrane deeply concave behind, the emargination extending as high as a line drawn between the knees; calcaneum about half as long as the foot.

Fur dark brown on the surface above, but the greater part of the hairs pale whitish buff; beneath light brown. The muscular part of the forearm is covered with short fur, but the membranes and remaining parts of the extremities are nearly naked; the interfemoral membrane has a few fine hairs, forming a thin fringe along its free margin.

Upper inner incisors minute, rising but slightly above the gum, not one third the size of the small outer incisors, which are triangular and subacutely pointed; first upper premolar with an acute cusp placed close to the canine, separated by a slight interval from the second premolar, which is larger than it and exceeds it in vertical extent; the second premolar has blunt anterior and posterior basal projections, and is close to the third premolar, which exceeds it in vertical extent also, and has similar projections from its base; molars with very narrow W-shaped cusps, exceeded in width by the horizontal internal basal portion; lower incisors deciduous; first lower premolar rather large, close to the canine, separated from the second by a small space, and exceeding it in antero-posterior diameter and in vertical extent; the third is the longest tooth in the lower jaw, and is separated by a narrow interval from the second, it has prominent anterior and posterior basal projections (Plate XXVII. figs. 4–4 *b*).

Length, head and body about 2″, ear 0″·5, tragus 0″·2, forearm 1″·25, thumb 0″·35; third finger—metacarp. 1″·4, 1st ph. 0″·5, 2nd ph. 0″·75, 3rd ph. 1″·45; fourth finger—metacarp. 1″·3, 1st ph. 0″·35, 2nd ph. 0″·5; fifth finger—metacarp. 1″·15, 1st ph. 0″·35, 2nd ph. 0″·5; tibia 0″·5, foot 0″·4, calcaneum 0″·2.

Hab. Surinam; Brazil.

a–c. imm. et ad. sks.	Brazil.	Purchased.
d. ad. sk.	Sta. Catherina, Brazil.	Purchased.
e. ad. sk., al.	Minas Gerraes, Brazil.	Purchased.
f. ad. sk.	Bahia.	Comte de Castelnau [C.].

2. Lonchoglossa wiedii.

Glossophaga ecaudata, *Wied* (non *Geoffroy*), *Beitr. Naturgesch. Brasil.* Bd. ii. p. 212 (1826).

Anura wiedii, *Peters*, *MB. Akad. Berl.* 1869, p. 398.

Considerably larger than *L. caudifera*, and at once distinguished from it by the absence of any trace of a tail, and by the hairiness of the interfemoral membrane and legs.

Calcaneum very short; the narrow interfemoral membrane about 0″·15 wide all round, wholly clothed with hair, which forms a fringe along its free margin; the legs are also covered to the ankles with short fur. Colour of the fur very similar to that of *L. caudifera*.

Length, head and body 2″·5, head 1″·05, ear 0″·55, tragus 0″·2, forearm 1″·6, thumb 0″·35; third finger—metacarp. 1″·5, 1st ph. 0″·5, 2nd ph. 0″·8, 3rd ph. 0″·55; fourth finger—metacarp. 1″·45, 1st ph. 0″·37, 2nd ph. 0″·55; fifth finger—metacarp. 1″·25, 1st ph. 0″·35, 2nd ph. 0″·5; tibia 0″·5, foot 0″·4.

(The above measurements were taken by me from the type, which is preserved in the collection of the Paris Museum.)

Hab. Brazil (Porto Seguro; Rio de Janeiro).

This species, by the absence of the tail and hairiness of the legs and interfemoral membrane, resembles *Glossonycteris geoffroyii* externally, which has been placed in a separate genus, chiefly on account of the absence of the zygomatic arches.

21. GLOSSONYCTERIS.

Glossonycteris, *Peters, MB. Akad. Berl.* 1868, p. 385.

General characters those of *Lonchoglossa*, with which this genus also agrees in the dental formula, but differs in the form and arrangement of the teeth and in the non-development of the zygomatic arches.

1. Glossonycteris geoffroyii.

Anoura geoffroyii, *Gray, Mag. Zool. & Bot.* ii. p. 490 (1838).
? Chœronycteris peruana, *Tschudi, Fauna Peruana*, i. p. 71, pl. iii. figs. 1, 2 (1844–46) (vide *Peters, MB. Akad. Berl.* 1868, p. 385).
Anoura ecaudata, *Geoffroy, Saussure, Rev. et Mag. Zool.* xii. p. 494 (1860).
Glossonycteris lasiopyga, *Peters, l. c.* pl. figs. 2–2 *e* (skull and teeth).

Muzzle and nose-leaf as in *Ischnoglossa nivalis*, the anterior angle of the eye is equally distant from the tragus and the extremity of the muzzle; ears slightly more than half the length of the head, rounded off above, the outer margin of the ear-conch deeply concave in its upper half, then convex, again emarginate opposite the tragus, thence convex to the base; tongue as in *G. soricina*, the sides very thickly set with long filiform papillæ.

Thumb considerably shorter than the foot; wing-membrane from the distal third of the tibia; interfemoral very short, the emargination extending upwards as high as the proximal third of the tibia; no trace of a tail externally; calcaneum rudimentary; feet large, nearly as long as the tibia.

Fur, above, dark brown, the basal half or three fourths of the hairs pale buff-brown; beneath, brown at the base of the hairs, the extremities greyish brown. The wing-membrane is clothed on the upper surface almost as far outwards as a line drawn from the elbow to the knee, and the fur extends thickly along the legs and upon the narrow interfemoral membrane to the ankles; the greater part of the antebrachial membrane is thinly covered, and some hairs appear upon the metacarpal bone of the thumb; beneath the wing-membranes are nearly naked, but the margin of the interfemoral has a long fringe.

Upper outer incisors larger and longer than the inner ones, which are round and obtusely pointed, the outer incisors triangular and subacute; first upper premolar scarcely one third the size of the second, with an oblique cusp and a small posterior basal projection placed in the posterior part of the wide space between the canine and second premolar; second premolar very narrow, with an acute cusp and a prominent basal projection in front and behind, nearly equal in antero-posterior diameter to the third premolar, which exceeds it in vertical extent; molars with small W-shaped cusps and horizontal flat internal basal projections, the last molar equal to three fourths the antepenultimate molar, with a V-shaped cusp.

In the lower jaw the incisors are deciduous; the three premolars are as large as the second upper premolar, the first is close to the

canine and separated from the second by a space, and it has no anterior basal projection*.

The following Table exhibits the measurements (I.) of the type (a dried skin), and (II.) those of an immature specimen (preserved in alcohol) in which the permanent teeth have partially replaced the milk dentition. The comparative measurements show that the type specimen is not full-grown:—

	I.	II.
Length, head and body (about)	2·4	2·3
„ interfemoral membrane in the middle	...	0·15
„ head	1·05	1·05
„ ear	0·6	0·6
„ tragus	0·22	0·22
„ forearm	1·6	1·7
„ thumb	0·35	0·35
„ third finger, metacarpal	1·6	1·6
„ „ 1st phalanx	0·5	0·6
„ „ 2nd „	0·85	0·9
„ „ 3rd „	0·6	0·6
„ fourth finger, metacarpal	1·5	1·5
„ „ 1st phalanx	0·4	0·45
„ „ 2nd „	0·6	0·55
„ fifth finger, metacarpal	1·30	1·25
„ „ 1st phalanx	0·32	0·35
„ „ 2nd „	0·5	0·5
„ tibia	0·56	0·55
„ foot	0·45	0·45

Hab. Mexico; Guatemala; Brazil.

a. imm. ad. sk. (type).	Brazil.	
b. ♀ imm., al.	Brazil.	
c. ♀ imm., al.	Choctum.	O. Salvin, Esq. [C.].

22. CHŒRONYCTERIS.

Chœronycteris, *Lichtenstein, Tschudi, Fauna Peruana*, p. 70 (1844); *Peters, MB. Akad. Berl.* 1865, p. 354, 1868, p. 366.

Muzzle longer than in any of the preceding genera; ears, tongue, and nose-leaf as in *Glossonycteris*; tail short but distinct, appearing on the upper surface of the well-developed interfemoral membrane.

Dentition. Inc. $\frac{2-2}{2-2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{3-3}{3-3}$.

Outer upper incisors larger than the inner ones; the lower incisors and the first upper premolar deciduous; molars very narrow, without distinct W-shaped cusps; skull very long, without zygomatic arches (Plate XXVII. figs. 6, 6 *a*).

Range. Mexican and Brazilian Subregions.

This genus agrees with *Glossophaga* more closely than with any

* Dr. Peters mentions (MB. Akad. Berl. 1869, p. 398) that he found in one specimen, between the first and second lower premolars, a smaller premolar, so that the number of teeth in this species is pm. $\frac{3-3}{4-4}$, m. $\frac{3-3}{3-3}$. May not this small tooth be a persistent milk-tooth?

other in the large size of the interfemoral membrane, but also differs from it as remarkably in the form of the skull and teeth (see Plate XXVII. figs. 6, 6 *a*, teeth of *Ch. minor*).

Synopsis of the Species.

a. Calcaneum shorter than the foot; forearm 1″·7 ..... 1. *Ch. mexicana*, p. 510.
b. Calcaneum longer than the foot; forearm 1″·35..... 2. *Ch. minor*, p. 511.

1. Chœronycteris mexicana.

Chœronycteris mexicana, *Tschudi, Fauna Peruana*, p. 72, pl. iii. fig. 3 (1844); *Peters, MB. Akad. Berl.* 1868, p. 366.

Muzzle longer than in any of the preceding species; ears as in *Glossonycteris geoffroyii*, but less than half the length of the head (Plate XXVII. fig. 5, head and tongue).

Thumb shorter than the foot; wing-membrane extending to the ankles or tarsi; interfemoral membrane well developed, extending almost as far back as a line drawn between the ankles, the posterior margin concave behind; tail about one third the length of the interfemoral; calcaneum shorter than the foot.

Fur, above, dark brown, the base of the hairs light greyish brown; beneath, light brown; on both surfaces moderately long and dense, but scarcely extending to the membranes; the extremities and the interfemoral membrane, above and beneath, naked; the head clothed with short fur, but the extremity of the muzzle around the nose-leaf and chin beset with long straight hairs.

Upper incisors very short, the outer incisors slightly larger than the inner ones; lower incisors deciduous; first upper premolar deciduous, the second separated by a wide space from the canine; the second and third premolars narrow, triangular, acutely pointed, equal in vertical extent, without basal cusps; first upper molar very narrow, triangular in cross section at the base (the vertex of the triangle being posterior), the outer cutting side without trace of W-shaped cusps, but with a longer anterior and shorter posterior tubercle; second upper molar slightly broader at the base, third similar; all the premolars and molars separated by spaces; first lower premolar close to the canine and separated from the next tooth by a space equal to half its length, larger than the second or third premolar, nearly as deep in front and behind as in the centre; second and third premolars nearly equal in size, each with a central acute cusp and a smaller basal cusp in front and behind; third premolar as far from the first molar as the first premolar is from the second; molars equidistat and nearly equal in size, the second slightly broader than the other two.

Length, head and body 2″·6, tail 0″·25, interfemoral membrane about 0″·7, head 1″·25, ear 0″·6, tragus 0″·25, nose-leaf 0″·25, forearm 1″·7, thumb 0″·35; third finger—metacarp. 1″·6, 1st ph.

0″·65, 2nd ph. 0″·82, 3rd ph. 0″·5; fourth finger—metacarp. 1″·5, 1st ph. 0″·45, 2nd ph. 0″·55; fifth finger—metacarp. 1″·45, 1st ph. 0″·35, 2nd ph. 0″·5; tibia 0″·62, foot 0″·42, calcaneum 0″·26.

Hab. Mexico; Guatemala.

a. ♀ ad., al.	Dueñas, Guatemala.	O. Salvin, Esq. [C.].
b. ad. sk., al.	Dueñas, Guatemala.	O. Salvin, Esq. [C.].

2. Chœronycteris minor.

Chœronycteris minor, *Peters, MB. Akad. Berl.* 1868, p. 366.

Considerably smaller than *Ch. mexicana*, and with shorter ears, which are also less deeply emarginate externally; the calcaneum is conspicuously longer than the foot. Colour and distribution of the fur as in *Ch. mexicana*; dentition also similar (Plate XXVII. figs. 6, 6 *a*).

Length, head and body 2″·2, tail 0″·26, head 1″, ear 0″·48, tragus 0″·15, nose-leaf 0″·15 × 0″·13, forearm 1″·35, thumb 0″·28, third finger—metacarp. 1″·35, 1st ph. 0″·48, 2nd ph. 0″·7, 3rd ph. 0″·45; fourth finger—metacarp. 1″·25, 1st ph. 0″·34, 2nd ph. 0″·4; fifth finger—metacarp. 1″·15, 1st ph. 0″·3, 2nd ph. 0″·4; tibia 0″·45, calcaneum 0″·44, foot 0″·32.

Hab. Surinam.

a. skull.	Rio Cupari.	H. W. Bates, Esq. [C.].

(Figured in Plate XXVII. figs. 6, 6 *a*.)

Group 3. STENODERMATA.

Stenodermata, *Peters, MB. Akad. Berl.* 1865, p. 257.

Muzzle very short and generally broad in front, the distance between the eyes nearly always exceeding, rarely equal to, the distance from the eyes to the extremity of the muzzle; nose-leaf generally short, horseshoe-shaped in front and lanceolate behind (except in *Brachyphylla* and *Centurio*), the horizontal portion surrounding the nasal apertures; interfemoral membrane always concave behind; tail none; inner margin of the lips fringed with conical papillæ.

Dentition. Inc. $\frac{4}{4}$ or $\frac{4}{2}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$ or $\frac{2-2}{3-3}$ or $\frac{2-2}{2-2}$.

Premolars and molars very broad (except in *Sturnira*), the latter with broad concave or flat crowns, margined externally by raised, narrow, notched cutting-edges, without trace of W-shaped cusps (see Plate XXIX.).

Comparison of the dental formulæ of this group and of the *Vampyri* shows that in the *Stenodermata* the number of the premolars is constant and that of the molars is variable, while the reverse is the case in the *Vampyri*. In this respect, as well as in the form of their molar teeth, the insectivorous *Vampyri* agree with other groups of insectivorous Bats; while the frugivorous *Stenodermata*, in their concave crowned and variable molars, resemble many of the

species of the frugivorous *Pteropi*, otherwise so widely separated from them.

While the variability in the number and size of the premolars in the *Vampyri* evidently depends on the length of the jaws beyond the orbits, in the *Stenodermata* the corresponding portion of the jaws having become shortened to the utmost limit apparently, the number of the premolars is permanently reduced to $\frac{2-2}{2-2}$ (therefore, probably, the typical number in Chiroptera), and the variability in the number and size of the true molars appears to be due to the backward pressure of the teeth in front of the posterior molars in both jaws, which prevents their growth or causes them to fall out.

Although the *Stenodermata* are generally easily distinguished from the *Vampyri* by the peculiar shortness and breadth of the muzzle and by the form of the molar teeth, certain species of the latter group closely resemble those of the former in external appearance, agreeing almost absolutely in the form of the nose-leaf, of the ears and tragus, and of the warts on the chin. These resemblances show that, while the form of the teeth and jaws has become modified to suit the food of the animals, the external characters, being but slightly affected by this cause, have remained much the same, and now indicate their common origin.

The observations of Mr. P. H. Gosse and Mr. W. Osburn in Jamaica, tend to show that the food of these Bats is, either wholly or in great part, tree-fruit (see remarks on habits of *Artibeus* and *Stenoderma* at pp. 514, 528).

Synopsis of the Genera.

A. Nostrils opening on the surface of a well-defined nose-leaf.
  a. Muzzle broad and very obtuse in front.
    a'. Crowns of the molar teeth very broad, their transverse exceeding their longitudinal diameter in cross section.
      a''. Facial portion of the skull flat and broad, not elevated in front.
        a'''. Nasal opening in the skull small, not prolonged backwards; the second molar in both jaws smaller than the first.
          *a*⁴. Bony palate extending backwards in the centre behind the last molars.
            α. Upper middle incisors broad and straight; third upper molar rudimentary or absent; molars very broad ..... 23. ARTIBEUS, p. 514.
            β. Upper middle incisors conical and oblique; third upper molar small but distinct; molars narrower than in *Artibeus* .. 24. VAMPYROPS, p. 522.

*b*⁴. Bony palate not extending backwards, deeply emarginate in the centre between the molars.
aa. Crown of the head slightly elevated above the face-line.
γ. Upper middle incisors straight, broad, or conical; molars as in *Artibeus* ..... [p. 526. 25. STENODERMA,
ββ. Crown of the head greatly elevated above the very broad and short muzzle.
δ. Upper middle incisors straight, conical; molars as in *Stenoderma*, but narrower ..... 26. AMETRIDA, p. 530.
b‴. Nasal opening in the skull prolonged backwards by a longitudinal fissure in the centre between the orbits; the second molars in both jaws larger than the first.
ε. Upper middle incisors as in *Vampyrops*; skull narrower in front ..... [p. 531. 27. CHIRODERMA,
b″. Facial portion of the skull greatly elevated in front.
ζ. Upper incisors straight, conical; second (last) molar in both jaws very small..... 28. PYGODERMA, p. 536.
b. Muzzle conical.
b′. Crowns of the anterior molar teeth rather narrow and longitudinally grooved, their longitudinal equalling their transverse diameter.
η. Nose-leaf well developed, as in *Artibeus*; interfemoral membrane very narrow, margining the legs..... 29. STURNIRA, p. 538.
c′. Crown of the molar teeth broad, their transverse exceeding their longitudinal diameter.
θ. Nose-leaf very short behind; interfemoral membrane large [p. 540. 30. BRACHYPHYLLA,

B. No distinct nose-leaf; nostrils opening in a concavity at the extremity of the muzzle.
a. Muzzle short and very broad in front.
ι. Face with naked elevated cutaneous ridges; throat with transverse bands; teeth as in *Stenoderma* ..... 31. CENTURIO, p. 542.

23. ARTIBEUS.

Artibeus, *Leach, Linn. Trans.* xiii. p. 75 (1822); *Peters, MB. Akad. Berl.* 1865, p. 356.
Madatæus, *Leach, l. c.* p. 81.
Arctibeus, *Gray, Mag. Zool. & Bot.* ii. p. 487 (1839).
Pteroderma, *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 34 (1855).
Platyrrhinus, *Saussure* (in part), *Rev. et Mag. Zool.* 1860, p. 429.

Muzzle very short, broad in front; general form of the ears, nose-leaf, and tragus as in *Phyllostoma*, the posterior erect leaf with a very prominent longitudinal ridge; eyes large; head slightly raised above the face-line; lower lip with a central wart in front and a smaller one on either side, the whole margined laterally and beneath by a row of much smaller warts; inner margin of the lips fringed with small conical papillæ; wing-membrane extending to the feet; tail none; interfemoral membrane emarginate behind; calcaneum short, distinct.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{2-2}{2-2}$, or $\frac{2-2}{3-3}$, or $\frac{3-3}{3-3}$.

Upper middle incisors moderate, each with a single broad vertically directed cusp, notched on its cutting-edge; outer incisors very small, with oblique cusps; molars very broad, with concave crowns and small marginal cusps externally and internally, the third molar in both jaws very small or absent; bony palate produced backwards as far as a line corresponding to the middle of the zygomatic arches.

Range. Tropical parts of the Neotropical Region.

Representatives of this genus are found throughout the Neotropical Region wherever tree-fruit is abundant, of which their food principally, if not altogether, consists. On the floors of caves in Jamaica inhabited by *A. perspicillatus* Mr. Osburn found fragments of bread-nut (*Brosimum*), of red berries (*Cordia collococca*), of the rose-apple (*Eugenia jambos*), and of unripe mangoes.

As might be supposed from the large size and nakedness of the eyes in the species of this genus, they are rather crepuscular than nocturnal in their habits, and often choose for their habitations places considerably exposed to daylight. Mr. Osburn has noticed that *A. perspicillatus* particularly haunts the entrance of caves or caves of small depth; and he found them in great numbers in Aquatta Vale, Jamaica, clustering under the fronds of the cocoa-nut palm. The writer, also, found a colony of the closely-allied species, *A. planirostris*, roosting under the slightly projecting eaves of a house in Demerara, where they were exposed to the full glare of the setting sun.

The species of *Artibeus* have been divided into three subgenera, according to the presence or absence of the minute last upper or lower molars; but, as I find that the presence of these small last molars, certainly of the last upper molars, is variable even in the same species, it is evident that this character can scarcely be considered of much importance.

Synopsis of the Species.

I. Molars $\frac{3-3}{3-3}$ ..... (Subg. URODERMA, Ptrs.)
- *a*. Front edge of the nose-leaf free, well developed.
  - *a'*. Sides of the horseshoe straight, not lobed.
    - *a''*. Head with or without ill-defined whitish streaks; forearm 2''·7 .. 1. *A. planirostris*, p. 515.
  - *b'*. Sides of the horseshoe with rounded lobes.
    - *b''*. Head with four distinct white streaks; back with a white line along the spine; forearm 1''·6 ..... 2. *A. bilobatus*, p. 518.

II. Molars $\frac{2-2}{3-3}$ ..... (Subg. ARTIBEUS, Ptrs.)
- *a*. Front edge of the nose-leaf bound down to the muzzle.
  - *a'*. Head with more or less distinct white streaks; forearm 2''·25 to 2''·8 ..... 3. *A. perspicillatus*, p. 519.

III. Molars $\frac{2-2}{2-2}$ ..... (Subg. DERMANURA, Gerv.)
- *a*. Interfemoral membrane extending as far back in the centre as a line corresponding to the knees; head without white streaks; forearm 1''·6 .. 4. *A. cinereus*, p. 520.
- *b*. Interfemoral membrane extending as far back in the centre as a line corresponding to the centre of the tibia; head with four white streaks; forearm 1''·55 ..... 5. *A. quadrivittatus*, p. 521.

1. Artibeus planirostris.

Phyllostoma planirostre *, *Spix, Simiar. et Vespert. Brasil.* p. 66, pl. xxxvi. fig. 1 (1823).
? Phyllostoma obscurum, *Wied, Beitr. Naturg. Brasil.* Bd. ii. p. 203 (1826).
Phyllostoma perspicillatum, *Burmeister, Thiere Brasiliens*, p. 45 (1854) (excl. syn.).
Artibeus fallax, *Peters, MB. Akad. Berl.* 1865 p. 355.

Crown of the head slightly raised above the face-line; muzzle thick, obtuse, rounded off broadly in front, the distance between the eyes considerably exceeds the distance between the eye and the end of the muzzle; ears shorter than the head, much longer than broad,

* Dr. Peters considers (MB. Akad. Berl. 1865, p. 587) that the species described under this name by Spix is identical with *A. perspicillatus*, as, on examination of the type, he found the number of molars to be the same. But Spix's original description does not apply at all to *A. perspicillatus*; for the nose-leaf is there described as "*inferius lateraliter et antice libere pendens*," whereas in that species it is fastened down to, or even confluent with, the muzzle in front. (See remarks at end of the description of this species.)

rounded at the tips; inner margin convex from the base upwards, outer faintly convex in upper fourth, then concave, again convex, slightly angularly emarginate opposite the upper third of the tragus and terminating abruptly at a short distance in front of its base; no process from the concave surface of the conch near the tragus as in *Phyllostoma hastatum*; tragus much thickened in its inner half, the outer margin thin, with a square-edged projection above its base, succeeded by a projecting tooth, shortly narrowed and acutely pointed above: nose-leaf well developed in front of the nasal apertures; anterior margin free, separated from the muzzle, straight, unnotched; sides similar, but considerably bent upwards; the vertical leaf thickened, ovate, and shortly acuminate, with a broad raised longitudinal ridge in front: upper and lower lips margined with small warts and fringed internally with long horizontal papillæ; front of the lower lip with three warts arranged in a triangular space, and bounded laterally and beneath by eight or ten small warts (Plate XXX. fig. 1, nose-leaf and chin, natural size).

Wing-membrane extending to the metatarsus; interfemoral membrane angularly emarginate behind to a height about level with the middle of the tibia.

Fur short but dense, black with a greyish tinge, the base of the hairs paler or even white. In some specimens the face is marked with two longitudinal faint whitish streaks, one on each side, extending from the posterior margin of the nose-leaf above the eye to the crown of the head. In many specimens even these pale streaks are quite absent. Of several female specimens obtained by me in Demerara one only had the white facial streaks very faintly marked.

The wing-membrane is nearly naked; a few short hairs only appear upon the forearm, and the interfemoral membrane is almost devoid of hair.

Skull broad and short, the distance between the outer margins of the first molars is nearly equal to the length of the palate; the bony palate extends as far backwards as the middle of the slender zygomatic arches; frontal flattened between the slightly developed postorbital processes; two small infraorbital foramina placed one above the other.

Upper middle incisors vertically directed, with broad slightly convex cutting-edges, shortly bifid; outer incisors very short, scarcely equalling the cingulum of the canines in vertical extent, with oblique crowns directed inwards and forwards; canine without basal cusp; first upper premolar with a very oblique crown, similar to the outer incisor in shape, directed forwards and downwards, with a posterior and external basal cusp; second upper premolar three fourths the canine in vertical extent, and exceeding it in cross section at the base, with two small posterior basal cusps placed one above the other, like the teeth of a saw; these cusps become worn down, and disappear in old individuals; the base of this tooth projects much internally and is concave; the first molar is very broad (its breadth equals double its antero-posterior diameter), with

two external, narrow, sharp-edged cusps, the flat or slightly concave inner side of the tooth forms quite four fifths of its crown, and has two very small cusps on its antero-internal margin, which become worn down with age; second molar two thirds the antepenultimate molar, with a single narrow and long external cusp, one posterior and one internal and anterior basal cusp, between these cusps the crown of the tooth is concave; third molar very small, scarcely larger than one of the lower incisors, *placed in a concavity in the posterior side of the second molar*, and very easily overlooked on examination; lower incisors very small, equal, not grooved; canine with a small posterior basal cusp; first lower premolar obliquely lozenge-shaped; second premolar with a posterior obtuse basal cusp; molars with broad flat crowns, from the antero-external and antero-internal margins of which short cusps arise, the second molar about three fourths the first, the last molar very small, circular, about the size of the last upper molar (Plate XXVIII. fig. 1).

Length (of an adult ♀), head and body 3″·2, interfemoral membrane in the middle 0″·7, head 1″·2, ear 0″·55, tragus 0″·28, nose-leaf 0″·5×0″·3, forearm 2″·6, thumb 0″·6; third finger—metacarp. 2″·3, 1st ph. 0″·8, 2nd ph. 1″·2, 3rd ph. 0″·9; fourth finger—metacarp. 2″·25, 1st ph. 0″·7, 2nd ph. 0″·9; fifth finger—metacarp. 2″·3, 1st ph. 0″·5, 2nd ph. 0″·7; tibia 0″·95, foot 0″·65.

Hab. Guiana, Brazil (Pernambuco).

I have identified this species with that described by Spix under the name of *Phyllostoma planirostre*, as the characters agree in all respects. The absence of the last minute upper premolar in the type may be due either to the immaturity or to the advanced age of the specimen. Of three specimens from Pernambuco in the Collection, one (immature) has the last upper molar extremely small, so small as to be discovered with considerable difficulty; the second and third (immature and adult respectively) have no trace of this tooth.

This species appears to be very abundant in British Guiana. I found colonies of it inhabiting the roofs of every house in which Bats were discovered. It is especially common in the roofs of the sugar-factories, the heat of which probably attracts it.

a, b. ♂ ad., al.	Isle of Grenada.	Purchased.
c. ad. sk.	America.	
d. ad. sk.	America.	Purchased.
e. ♀ ad., al.	British Guiana.	Sir R. Schomburgk [P.].
f. ♂ ad., al.	Demerara.	Capt. Sabine [P.].
g. ♀ ad., al.	Demerara.	G. E. Dobson, M.B. [E.].
h. ♂ imm., al.	Demerara.	Purchased.
i. ♂ imm., al.	Para.	Purchased.
j–l. imm. et ad. sks.	Pernambuco.	J. P. G. Smith, Esq. [P.].
m. ad. sk.	Acapulco.	Purchased.
n. ♀ ad., al.		M. Lidth de Jeude.

Var. *a*.

Artibeus concolor, *Peters, MB. Akad. Berl.* 1865, p. 357.

Much smaller than adult specimens of *A. planirostris*, the forearm measuring 1″·85 as compared with 2″·6. Fur, above uniform brown, paler beneath, without either white streaks on the head or white spots on the shoulders; wing-membranes dark brown, except the space between the second and third finger, which is whitish brown. In other respects quite similar to *A. planirostris*.

Length (of an adult ♂), head and body 2″·6, head 1″, ear 0″·63, nose-leaf 0″·48, forearm 1″·85, tibia 0″·7.

Hab. Paramaribo, Surinam.

Type in the collection of the Berlin Museum.

The above is taken from Dr. Peters's short description, as I have not yet seen the type.

a.	♀ ad., al.	Upper Amazons.	Purchased.

2. Artibeus bilobatus.

Uroderma personatum, *Peters* (*non Wagner*), *MB. Akad. Berl.* 1865, pp. 587, 588 (see footnote).
Uroderma bilobatum, *Peters, l. c.* 1866, p. 392.

Ears, lips, and lancet-shaped portion of the nose-leaf (except that the margin is finely crenulately serrate) quite similar to those of *Vampyrops helleri* (see p. 524). The horseshoe, of which the margin is free round about, is distinguished from that of every other species by the presence of a rounded lobe on either side.

The wing-membrane does not quite extend to the end of the metatarsus. Interfemoral naked, or thinly sprinkled over with very short hairs, triangularly emarginate behind. Calcaneum very short.

The fur of the body extends as far as the middle of the forearm; the whole tibia and the lower end of the femur naked.

Brown, with four white streaks on the head and a white line along the middle of the back.

Length (of an adult ♂ preserved in alcohol), head and body 3″, head 0″·95, ear 0″·6, tragus 0″·2, forearm 1″·6, thumb 0″·4; third finger—metacarp. 1″·55, 1st ph. 0″·55, 2nd ph. 0″·85, 3rd ph. 0″·6; fourth finger—metacarp. 1″·53, 1st ph. 0″·48, 2nd ph. 0″·25; fifth finger—metacarp. 1″·53, 1st ph. 0″·35, 2nd ph. 0″·5; tibia 0″·6, calcaneum 0″·2, foot 0″·4, interfemoral membrane in the middle 0″·43.

Hab. Cayenne; Brazil (St. Paulo).

The above is a translation of Dr. Peters's description of this species, of which I have not yet examined a specimen. It was at first mistaken by Dr. Peters for *Phyllostoma personatum*, Wagner; but the type of that species has been lost, and the description given by Wagner is quite insufficient, being equally applicable, as Dr. Peters remarks, to large specimens of either *Vampyrops lineatus* or *Chiroderma villosum*.

This species appears to connect *Artibeus* with *Vampyrops* through *V. lineatus* and *V. helleri*, resembling both in size, in the white facial streaks, in the presence of a white line down the middle of the back, and, in common with the other species, in the number of the teeth, while it agrees with *V. helleri* closely in the form of the nose-leaf.

3. Artibeus perspicillatus.

Vespertilio perspicillatus, *Linnæus, Syst. Nat.* xii. ed. p. 47; *Schreber, Säugethiere*, p. 160, pl. xlvi. A (1775).
Phyllostoma perspicillatum, *Geoffroy, Ann. du Muséum*, xv. p. 176, pl. xi. (1810); *Wagner, Suppl. Schreb. Säugeth.* i. p. 402 (1844), v. p. 631 (1855).
Artibeus jamaicensis, *Leach, Linn. Trans.* xiii. p. 75 (1822).
Madatæus lewisii, *Leach, l. c.* p. 82.
? Phyllostoma superciliatum, *Wied, Beitr. zur Naturgesch. Brasil.* ii. p. 200 (1826).
Arctibeus perspicillatus, *Gray, Mag. Zool. & Bot.* p. 487 (1839).
Artibeus carpolegus, *Gosse, A Naturalist's Sojourn in Jamaica*, p. 151 (1851).
Pteroderma perspicillatum, *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 34, pl. viii. fig. 7, pl. x. fig. 1 (teeth) (1855).
Artibeus perspicillatus, *Peters, MB. Akad. Berl.* 1865, p. 356.

Resembles *A. planirostris* closely in size and in general appearance, but may be at once distinguished by the front margin of the nose-leaf being completely bound down to the muzzle, in some individuals even confluent with its integument.

Two longitudinal white streaks on the head are generally well defined in all full-grown individuals, and also a white patch on each shoulder at the point of origin of the antebrachial membrane, in this respect also contrasting with *A. planirostris*, in which the two upper head-streaks are only occasionally faintly defined and the shoulder-patches are absent.

Fur, above, dark brown in terminal third, the extreme tips of the hairs greyish, the basal three fourths pale brown; beneath, more greyish on the surface, the greater part of the hairs unicoloured light brown. Distribution of the fur as in *A. planirostris*.

Teeth as in *A. planirostris*, except that the minute third upper premolar is absent, and the posterior side of the antepenultimate molar is less concave.

Length (of an adult ♂ from Guatemala), head and body 3″·35, head 1″·1, nose-leaf 0″·5 × 0″·3, ear 0″·9, forearm 2″·7, thumb 0″·6; third finger—metacarp. 2″·5, 1st ph. 0″·9, 2nd ph. 1″·4, 3rd ph. 0″·9; fourth finger—metacarp. 2″·35, 1st ph. 0″·75, 2nd ph. 0″·95; fifth finger—metacarp. 2″·5, 1st ph. 0″·55, 2nd ph. 0″·8; tibia 0″·95, calcaneum 0″·3, foot 0″·65, interfemoral membrane in the middle 0″·7.

Hab. Mexican, Antillean, and Brazilian Subregions, apparently generally distributed throughout the two first-named subregions, but in many parts of the Brazilian Subregion its place appears to be taken by *A. planirostris*.

As in many other species of Bats, the peculiar mobility of the ears has been noticed in *A. perspicillatus*. Mr. Osburn remarks of a specimen which he was endeavouring to recapture:—"As I cautiously advanced the net, he showed his sense of danger by elevating the head a little, whilst the little round ears underwent a constant and very rapid motion as if vibrating, and, what made it more curious, each independently of the other. It had a very curious effect, like a person rolling his eyes different ways. The nose-leaf had also a motion, but slighter. It looked as if he were feeling for sound and smell, to ascertain the nature of the attack."

a. ad. sk.	Jamaica.	J. S. Redman, Esq. [P.].
	(Type of *Artibeus jamaicensis*, Leach.)	
b. imm. sk.	Jamaica.	W. Lewis, Esq. [P.].
	(Type of *Madatæus lewisii*, Leach.)	
c, d. ad. sks.	Jamaica.	P. H. Gosse, Esq. [C.].
	(Types of *Artibeus carpolegus*, Gosse.)	
e. ♂ ad., al.	Jamaica.	P. H. Gosse, Esq. [C.].
f. ♀ ad., al.	Content, Jamaica.	P. H. Gosse, Esq. [C.].
g. ad. sk.	Jamaica.	Dr. R. Parnell [C.].
h–k. ♂ & ♀ ad., al.	Cuba.	W. S. MacLeay [P.].
	(Types of *Artibeus macleayii*, Gray, MS.)	
l, m. ad. sks.	S. Domingo.	Purchased.
n. ad. sk.	Central America.	Dr. J. Richardson [C.].
o. ad. sk.	Mexico.	M. Sallé [C.].
p, q. ad. sks.	Dueñas, Guatemala.	O. Salvin, Esq. [C.].
r–t. ♂ & ♀ ad., al.	Dueñas, Guatemala.	O. Salvin, Esq. [C.].
u. ♂ ad., al.	Half-Moon Key, Honduras.	Purchased.
v. ♀ ad., al.	Costa Rica.	O. Salvin, Esq. [C.].
w, x. ad. sks.	New Grenada.	Purchased.
y. ad. sk.	Tachira, Venezuela.	Purchased.
z. ♂ ad., al.	Venezuela.	Mr. Dyson [C.].
a'. ad. sk.	Bogotá.	O. Salvin, Esq. [C.].
b'. ad. sk.	Brazil.	R. Graham, Esq. [P.].
c'. ad. sk.	Brazil.	J. Rocke, Esq. [P.].
d'–f'. ad. sks.	Brazil.	Purchased.
g'. ad. sk.	Para.	J. P. G. Smith, Esq. [P.].
h'. ad. sk.	Sta. Catherina.	Purchased.
i'. ad. sk.	Bolivia.	Mr. Bridges [C.].
j'. ad. sk.		Purchased.
k'. ♂ ad., al.	(*Artibeus grandis*, Gray, MS.)	
l'–n'. ad. sks.		
o'. ad. sk.		Earl of Derby [P.].
p'. skull.	Aquatta Vale, Jamaica.	P. H. Gosse, Esq. [C.].
q'. skull.	Jamaica.	J. S. Redman, Esq. [P.].
r'. skull of *i'*.		

4. Artibeus cinereus.

Dermanura cinereum, *Gervais, Expéd. du Comte de Castelnau*, p. 36, pl. viii. fig. 4, pl. ix. figs. 4 & 4*a*, pl. xi. fig. 3 (head, skull, and teeth) (1855).

Stenoderma tolteca, *Saussure, Rev. et Mag. Zool.* 1860, p. 427, pl. xv. fig. 4.

Externally similar to *A. perspicillatus*, but very much smaller, the forearm being fully one inch shorter than in adult specimens of that

species inhabiting the same locality, and the last minute lower molar is absent.

Fur black above and beneath, with a slightly ashy tinge. No white streaks on the face or along the spine.

Length (of an adult ♂), head and body 2″·15, interfemoral membrane in the middle 0″·4, head 0″·8, ear 0″·65, tragus 0″·25, nose-leaf 0″·4 × 0″·23, forearm 1″·6, thumb 0″·4; third finger—metacarp. 1″·45, 1st ph. 0″·5, 2nd ph. 0″·8, 3rd ph. 0″·6; fifth finger—metacarp. 1″·45, 1st ph. 0″·35, 2nd ph. 0″·48; tibia 0″·55, calcaneum 0″·2, foot 0″·4.

Hab. Central America (Mexico; Guatemala; Costa Rica); Brazil (Rio Ucayali).

The small size of the animal and absence of the third lower premolar is not due to immaturity, for a specimen in the collection from Guatemala with much-worn teeth presents the same characters.

I have examined the type of this species in the Paris Museum, and can find no difference between it and specimens from Mexico (*Dermanura toltecum*, Sauss.).

a. ad. sk.	Mexico.	Mr. Leadbeater [C.].
b. ♂ ad., al.	Guatemala.	O. Salvin, Esq. [C.].
c. ♂ ad., al.	Costa Rica.	Purchased.
d. ad. sk.	Tropical America.	

5. Artibeus quadrivittatus.

Artibeus (Dermanura) quadrivittatus, *Peters, MB. Akad. Berl.* 1865, p. 368.

Very similar to *A. cinereus*, but the nose-leaf is narrower and not so abruptly narrowed at the summit. Interfemoral membrane much deeper, its narrowest part in the centre extending as far backwards as a line drawn at right angles to the centre of the tibia; its upper surface thinly clothed with fine hairs, which also appear upon the legs and upon the backs of the feet.

Above brown, paler beneath; the head with four longitudinal, not very distinct, white streaks, arranged as in *A. perspicillatus*.

The outer upper incisors in this species and in *A. cinereus* have their external cusp nearly as large as the internal, while in *A. perspicillatus* the internal cusp is the principal part of the tooth.

Length (of an adult ♂), head and body 2″·1, interfemoral membrane in the middle 0″·55, head 0″·8, ear 0″·65, tragus 0″·23, nose-leaf 0″·45 × 0″·25, forearm 1″·55, thumb 0″·38; third finger—metacarp. 1″·45, 1st ph. 0″·55, 2nd ph. 0″·85, 3rd ph. 0″·6; fifth finger—metacarp. 1″·45, 1st ph. 0″·35, 2nd ph. 0″·5; tibia 0″·55, calcaneum 0″·2, foot 0″·4.

Hab. Surinam; Brazil.

a. ♂ ad., al.	Surinam.	Purchased.
b, *c*. ad. sks.	Pernambuco.	J. P. G. Smith, Esq. [P.].
d. ♀ ad., al.	No history.	

24. VAMPYROPS.

Artibeus, *Gervais* (in part), *Expéd. du Comte de Castelnau, Zoologie*, p. 35 (1855).
Platyrrhinus, *Saussure* (in part), *Revue et Mag. Zool.* 1860, p. 429.
Vampyrops, *Peters, MB. Akad. Berl.* 1865, p. 356.

Muzzle longer and narrower than in *Artibeus*; nose-leaf, warts of the lower lip, and ear-conch as in that genus, but the tragus is deeply incised externally opposite the base of its inner margin, the interfemoral membrane is less developed, and in all the species known a line of white fur extends along the spine.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Teeth intermediate in character between those of *Artibeus* and those of *Sturnira*; the middle upper incisors directed obliquely inwards and forwards; molars much narrower than in *Artibeus*, the last lower molar well developed; skull in general form as in *Artibeus*, but the facial portions more lengthened (see Plate XXIX. figs. 1, 1 *a*, teeth of *V. vittatus*).

Range. Mexican and Brazilian Subregions.

This genus shows its close relationship to *Artibeus* in the general form of the ears, of the nose-leaf, and of the warts on the chin; but the facial portion of the skull is narrower and more produced, the form of the upper incisors is very different, the molars are much narrower above and beneath, the third upper and lower molars are as large or larger in cross section than the upper middle incisors, and in all the known species a narrow line of white fur extends from the head along the centre of the back.

Synopsis of the Species.

a. Smaller; with four very distinct white streaks on the head.
  α. Fur extending outwards upon the wing-membrane as far as a line drawn from the elbow to the knee; forearm 1″·65 ..... 1. *V. lineatus*, p. 522.
  β. Fur extending outwards as far as a line drawn from the elbow to the middle of the tibia; forearm 1″·4 ..... 2. *V. helleri*, p. 524.
b. Larger; white streaks on the head much less distinct.
  γ. Fur extending outwards upon the wing-membrane as far as a line drawn from the elbow to the middle of the femur; forearm 2″·35. 3. *V. vittatus*, p. 524.

1. Vampyrops lineatus.

Phyllostoma lineatum, *Geoffroy, Ann. du Muséum*, xv. p. 180 (1810); *Wagner, Suppl. Schreb. Säugeth.* i. p. 408 (1844), v. p. 633 (1855); *Burmeister, Thiere Brasiliens*, p. 48 (1854).
Arctibeus lineatus, *Gray, Mag. Zool. & Bot.* ii. p. 487 (1838).
Artibæus lineatus, *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 35, pl. x. fig. 2 (teeth) (1855).

Vampyrops lineatus, *Peters*, *MB. Akad. Berl.* 1865, p. 356, 1876, pp. 430–432, pl. i. figs. 8–14 (head, tragus, skull, and teeth).

About the size of *Artibeus cinereus*, but the muzzle is conspicuously longer and narrower. Tragus abruptly acuminate, the outer margin with a prominent rounded lobe near its base, and above it a projecting tooth. Horizontal nose-leaf free at the very margin only, circular, finely crenulate; the lanceolate portion as in *A. cinereus*.

Wing-membrane extending to the metatarsus close to the base of the toes; calcaneum short, distinct; interfemoral membrane short, concave behind, scarcely extending in the middle beyond a line drawn between the knees.

Fur more or less dark brown above, paler or ashy-brown beneath; face with four white streaks arranged as in *A. perspicillatus*, but much broader and very distinct; a narrow line of white fur extends from the occiput to the interfemoral membrane; the outer and inner sides of the ear-conch are margined with white in their lower three fourths.

Upon the wing-membrane the fur extends outwards nearly as far as a line drawn from the elbow to the knee; the upper surface of the interfemoral is very thinly clothed, but a fringe of fine hairs hangs from its posterior free margin; the legs are nearly naked, and the toes are clothed with a few hairs.

Middle upper incisors moderate, each with a broad cusp directed inwards and slightly forwards, separated by its base from its fellow of the opposite side, but touching it by the inner side of its extremity; outer incisors very small, conical, straight, not filling up the spaces between the canines and the middle incisors; first upper premolar straight, like a small canine, second premolar very large, nearly equalling the canine in vertical extent; anterior cusp of the first molar but slightly shorter; last upper molar small, placed precisely as in *A. planirostris*, behind and to the inner side of the antepenultimate molar; lower incisors very small, slightly notched; middle lower molar largest, first molar next in size, third molar smallest.

Length (of the type specimen), head and body about 2″·3, ear 0″·65, nose-leaf 0″·4, forearm 1″·65, thumb 0″·4; third finger—metacarp. 1″·6, 1st ph. 0″·65, 2nd ph. 0″·95, 3rd ph. 0″·7; fourth finger—metacarp. 1″·5, 1st ph. 0″·5, 2nd ph. 0″·6; fifth finger—metacarp. 1″·5, 1st ph. 0″·45, 2nd ph. 0″·5; tibia 0″·6, calcaneum 0″·2, foot 0″·4.

Hab. Brazil (Rio Janeiro; Sta. Catherina); Bahia; Mato Grosso; Columbia (Bogotá); Paraguay; Upper Amazons.

a. imm. sk.	Bogotá, Columbia.	
b. imm. sk.	Bahia.	M. F. de Castelnau [C.].
c. ad. sk.	Sta. Catherina, Brazil.	
d. ♀ ad., al.	Upper Amazons.	
e. ad. sk.	Brazil.	Purchased.
f. ♂ ad., al.		

2. Vampyrops helleri.

Vampyrops helleri, *Peters, MB. Akad. Berl.* 1866, p. 392.

The following is a translation of Dr. Peters's description of this species, of which I have not yet had an opportunity of examining a specimen :—

Smaller than *V. lineatus*, Geoffr., but very like that species. The ears are rounded, emarginate externally, and furnished with a rounded lobe at the base; tragus triangular, pointed, thickened on the inner margin, on the outer thin edge obtusely serrately toothed, and at the base provided with an almost two-lobed process. The horseshoe is free on the edge, each side above thickened, projecting outwards. The lancet is pointed with a broad, also lancet-shaped longitudinal raised ridge. The upper lip is finely notched; the under lip has, in the middle, a large transverse wart between two smaller warts, and near them seven warts in a line, which, with the corresponding row of the opposite side, form an obtuse angle.

Wings from the base of the toes. Interfemoral membrane hairy on the margin. The hair of the body extends outwards as far as the middle of the forearm, and on the upper surface of the tibia, so that as far as a line drawn from the proximal half of the tibia to the elbow the wing-membrane is covered with hair. Brown, with four white longitudinal bands on the head, and a spinal line of the same colour as in *V. lineatus*.

Length, head and body about 2″·6, head 0″·8, ear 0″·68, tragus 0″·2, nose-leaf 0″·4, forearm 1″·4, thumb 0″·45; third finger—metacarp. 1″·45, 1st ph. 0″·5, 2nd ph. 0″·88, 3rd ph. 0″·6; fourth finger—metacarp. 1″·45, 1st ph. 0″·43, 2nd ph. 0″·55; fifth finger—metacarp. 1″·46, 1st ph. 0″·36, 2nd ph. 0″·4; tibia 0″·36, calcaneum 0″·15, interfemoral membrane in the middle 0″·23.

Hab. Mexico.

The describer remarks that of this species he had examined two perfectly similar examples which Dr. Heller had collected in Mexico.

3. Vampyrops vittatus.

Artibeus vittatus, *Peters, MB. Akad. Berl.* 1859, p. 225.

Of the size and appearance of small specimens of *Artibeus planirostris*, but at once distinguished by the generic characters of a much longer and narrower muzzle and a differently shaped tragus.

The distance from the eye to the extremity of the muzzle is very nearly equal to the distance between the eyes; the horseshoe is broader and less developed in front than in *A. planirostris*, but its margin is also free all round and slightly raised from the muzzle; the length of the ear, anteriorly, is exactly equal to the distance of

the anterior extremity of its outer margin from the end of the muzzle; the tragus is similar to that of *V. lineatus*.

Wing- and interfemoral membranes as in *V. lineatus*.

Fur dark brown above and beneath, the upper facial streaks pale but distinct, the lower represented by a short naked white patch of integument on either side; a very distinct but narrow white line commences on the crown of the head and extends along the spine, contrasting strongly with the surrounding dark-coloured fur. On the wing-membrane above the fur extends outwards scarcely as far as a line drawn from the elbow to the middle of the femur; the antebrachial membrane is nearly naked, but the humerus and the muscular part of the forearm are covered; the interfemoral membrane is almost naked on its upper surface, but fringed along its posterior margin; the legs and back of the feet are clothed with short hairs.

Incisors as in *V. lineatus*, the upper middle pair with very oblique cusps widely separated at their bases, but meeting by the inner sides of their extremities (Plate XXIX. fig. 1*a*); the first upper premolar has a broader and more projecting base posteriorly than in that species, and its cusp is comparatively shorter (Plate XXIX. fig. 1); last upper molar directly behind the second molar, not pressed inwards, as large as one of the upper middle incisors; the first lower molar is triangular in horizontal section, and equal in antero-posterior diameter to the rectangular second molar; the last molar is nearly square, rather more than one quarter the superficial extent of the antepenultimate molar in horizontal section (Plate XXIX. fig. 1).

Length, head and body 3″·4, interfemoral membrane in the middle 0″·35, head 1″·35, eye from anterior margin of the nose-leaf 0″·45, nose-leaf 0″·5 × 0″·35, head 1″·35, ear 0″·9, tragus 0″·35, forearm 2″·35, thumb 0″·5; third finger—metacarp. 2″·15, 1st ph. 0″·9, 2nd ph. 1″·2, 3rd ph. 0″·85; fourth finger—metacarp. 2″·15, 1st ph. 0″·75, 2nd ph. 0″·85; fifth finger—metacarp. 2″·2, 1st ph. 0″·6, 2nd ph. 0″·7; tibia 0″·85, calcaneum 0″·28, foot 0″·6.

Hab. Costa Rica; Venezuela (Puerto Caballo).

This is the largest known species of the genus, and in size is to *V. lineatus* as small individuals of *A. perspicillatus* to *A. cinereus*. In Dr. Peters's very short original description the nose-leaf is described as being soldered down to the muzzle in front, which is not the case in the well-preserved specimen from which I have taken the above description, although the part of the nose-leaf in front of the nasal apertures is very short. It appears evident, however, that the original description was taken from a dried specimen in which the free front edge of the nose-leaf had so shrunk up in the drying process as to quite escape notice.

a. ♂ ad., al. Costa Rica. Purchased.

25. STENODERMA.

Stenoderma, *Geoffroy, Descr. de l'Egypte*, ii. p. 114 (1812).
Artibæus, *Gervais (non Leach), Expéd. du Comte de Castelnau, Zoologie*, p. 34 (1855).
Phyllops, *Peters, MB. Akad. Berl.* 1865, p. 356.
Ariteus, *Gray, P. Z. S.* 1866, p. 117.
Histiops, *Peters, l. c.* 1869, p. 399.
Stenoderma, Phyllops, Peltorhinus, *Peters, l. c.* 1876, p. 433.

Crown of the head slightly elevated; muzzle very short and broad, in length considerably less than the distance between the eyes; ears and general form of the nose-leaf as in *Artibeus*; interfemoral membrane short.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{2-2}{3-3}$ or $\frac{3-3}{3-3}$.

Molars very broad, with concave crowns, as in *Artibeus*; palate extremely wide and short, deeply emarginate behind, owing to the absence or imperfect development of the horizontal plate of the palate-bones.

Range. The Antillean Subregion.

The species of this genus agree so closely in external characters, and even in dentition, with those of *Artibeus*, that it would be impossible, from a consideration of these characters alone, to separate them into a distinct genus. The skull, however, shows remarkable differences in its structure, the horizontal plate of the palate-bones, which is so well developed in *Artibeus*, being here either partially or wholly absent, and the length of the jaws being so much diminished in proportion to their width, that both the upper canine and first premolar are in a plane considerably internal to the second premolar.

The habits of the species of *Stenoderma* appear to be similar to those of *Artibeus* (see p. 514).

The three species which represent this genus are by Dr. Peters considered generically distinct, and a separate genus has been formed by him for each, the three genera constituting a group. The characters by which these genera are, according to Dr. Peters, defined, will be understood from the Synoptical Table below, in which I use them for distinguishing the species. The presence or absence of the last minute upper molar can scarcely be considered even of specific value (as I have shown in the allied genus *Artibeus*); the obtuse outer cusp of the inner incisor in *S. achradophilum* is represented by the projection near the middle of the outer side of the same tooth in *S. rufum* and *S. falcatum*, and the concavity of the frontal bones in *S. rufum* differs in degree only from that of the same parts in *S. falcatum*, while the similarity of the dentition of the two species indicates their near affinity.

This genus, founded by Geoffroy on a single badly-preserved specimen (*S. rufum*), was long confounded with *Artibeus*, and Dr. Peters, on examination of the type (from which the skull had been removed), believed that it was identical with his genus *Vampyrops*; subsequently, however, he has shown that the missing skull was described and figured by Gervais under the name of *Artibæus undatus* (*vide* MB. Akad. Berl. 1876, pp. 429–433).

Synopsis of the Species.

a. Molars $\frac{2-2}{3-3}$; upper central incisors bicuspidate; sides of the palatal emargination parallel. (Subg. *Peltorhinus*, Ptrs.) .... 1. *S. achradophilum*, p. 527.

b. Molars $\frac{3-3}{3-3}$; upper central incisors unicuspidate.

a'. Frontal deeply concave; sides of the palatal emargination parallel. (Subg. *Stenoderma*, Ptrs.) ..... 2. *S. rufum*, p. 529.

b'. Frontal slightly concave; sides of the palatal emargination converging forwards. (Subg. *Phyllops*, Ptrs.)..... 3. *S. falcatum*, p. 529.

1. Stenoderma achradophilum.

Artibeus jamaicensis, *Gosse* (*non Leach*), *A Naturalist's Sojourn in Jamaica*, p. 270 (1851), pl. vi. fig. 3; *Gray*, *Ann. Nat. Hist.* 1839, p. 2; *Gervais*, *l. c.* p. 35, pl. ix. fig. 2.

Artibeus achradophilus *et* sulphureus, *Gosse*, *l. c.* p. 271, pl. vi. figs. 4, 5.

Ariteus flavescens, *Gray*, *P. Z. S.* 1866, p. 117.

Peltorhinus achradophilus, *Peters*, *MB. Akad. Berl.* 1876, pp. 433, 434, pl. ii.

Muzzle short and very broad, the distance between the eyes exceeds considerably the distance from the eye to the extremity of the muzzle; centre of the front margin of the horizontal nose-leaf slightly produced forwards in a small V-shaped process, terminating in a small wart-like elevation near the margin of the upper lip; posterior nose-leaf ovate-lanceolate, with an abruptly narrowed and very acute summit, with a longitudinal central ridge on its front surface as in *Artibeus perspicillatus*, which species it also closely resembles in the form of the ear-conch and tragus; lower lip with a small central wart in front, bounded by a smaller wart on each side and one on each side beneath.

Interfemoral membrane short, regularly concave behind; wings from the tarsi.

The fur of the body extends densely upon the wing-membrane above as far as a line drawn from the elbow to the ankle; nearly two thirds of the forearm are thickly covered, and fine hairs extend along the distal third to the carpus; the legs and the interfemoral membrane are covered with rather long hairs, which form a fringe along the posterior margin of the interfemoral and extend upon the legs to the base of the claws, some short hairs appearing on the wing-membrane and fringing part of its posterior margin.

Fur, above, light reddish brown, paler beneath, the middle of each hair lighter coloured; a small white patch of hair on each shoulder at anterior point of origin of the antebrachial membrane; no facial streaks. In immature individuals the fur is darker throughout.

The upper incisors form a straight line between the canines; the central incisors are much longer than the outer ones, directed vertically downwards, and bicuspidate, the inner cusp of each tooth narrow and acute, the outer cusp broad, obtuse, and shorter (Plate XXVIII. fig. 2*a*); outer incisors very short and flat-crowned, about as long as the cingulum of the canine; lower incisors equal, deeply and widely grooved in front and above; upper molars very broad, the breadth of the first upper molar equal to the conjoined antero-posterior diameters of the first and second molars; second upper molar nearly equal to the first in antero-posterior diameter; third lower molar small, oval, placed transversely directly behind the ante-penultimate molar, about equal in size to the base of one of the middle upper incisors (Plate XXVIII. fig. 2). Palate deeply emarginate as far forwards as a line joining the anterior inner margins of the first upper molars of opposite sides; sides of the emargination parallel.

Length (of an adult ♀, type of *A. achradophilus*, Gosse), head and body 2″·2, head 0″·8, ear 0″·7, tragus 0″·22, nose-leaf 0″·4 × 0″·25, forearm 1″·6, thumb 0″·4; third finger—metacarp. 1″·6, 1st ph. 0″·58, 2nd ph. 0″·95, 3rd ph. 0″·7; fourth finger—metacarp. 1″·6, 1st ph. 0″·5, 2nd ph. 0″·65; fifth finger—metacarp. 1″·63, 1st. ph. 0″·4, 2nd ph. 0″·55; tibia 0″·6, calcaneum 0″·2, foot 0″·4.

Hab. Jamaica; Cuba.

I have examined the types of *A. jamaicensis*, *A. achradophilus*, and *A. sulphureus*, Gosse, which are preserved in alcohol in this Collection, and I agree with Dr. Peters's statement, that they are all referable to the same species. They differ only in the depth of the colour of the fur, which appears to depend upon age, as the smallest of four specimens, the type of *A. jamaicensis*, Gosse, has fur of a darker shade than in any of the other three.

Mr. Gosse remarks that this species "feeds on the fruit of the Naseberry (*Achras sapota*). About a quarter of an hour after the sun has set, and while the horizon is still glowing with effulgent clouds, these Bats begin to fly round the tree. . . . . On picking up the fruit find that it has been just bitten, nibbled in a ragged manner. Fragments of Naseberry of considerable size, partly eaten by a Bat, are frequently found at the distance of half a mile from the nearest Naseberry-tree. The Rose-apple (*Eugenia jambos*) is also a favourite fruit."*

a. ♂ imm., al. Content, Jamaica. P. H. Gosse, Esq. [C.].
(Type of *Artibeus jamaicensis*, Gosse, *non* Leach.)
b. ♀ ad., al. Content, Jamaica. P. H. Gosse, Esq. [C.].
(Type of *Artibeus achradophilus*, Gosse.)
c. ♀ ad., al. Content, Jamaica. P. H. Gosse, Esq. [C.].
(Type of *Artibeus sulphureus*, Gosse, *Ariteus flavescens*, Gray?)
d. ♀ ad., al. Jamaica. Sir Andrew Smith [P.].
e. ♀ ad., al. Cuba. W. S. MacLeay, Esq. [P].

* 'Naturalist's Sojourn in Jamaica,' p. 268.

2. Stenoderma rufum.

Stenoderma rufum, *Geoffroy, Descr. de l'Egypte*, ii. p. 114 (1812); *Peters, MB. Akad. Berl.* 1876, pp. 430–434, pl. i. figs. 1–7.
Artibæus undatus, *Gervais, Expéd. du Comte de Castelnau, Zoologie, Mammifères*, p. 35, pl. ix. fig. 3 (1855).
Dermanura undatum, *Gervais, Compt. Rendus de l'Acad. des Sciences*, 1856, p. 547.
Histiops undatus, *Peters, l. c.* 1869, p. 399.

This species is known only from a skin in bad condition and a skull preserved in the collection of the Paris Museum, and from the descriptions and figures referred to above.

The central upper incisors are unicuspidate; a small obtuse prominence, near the middle of the outer side of each tooth, corresponds to the obtuse outer cusp of the same tooth in *S. achradophilum*; in the upper jaw a minute third molar, nearly equal to the base of the middle upper incisor in cross section, is placed immediately behind the second molar to the inner side of the tooth-row; second upper molar as large as in the preceding species. Palate emarginate as far forwards as a line joining the anterior inner margins of the first upper molars of opposite sides; sides of the emargination parallel as in *S. achradophilum*. Frontal bones deeply concave in front.

Hab. Unknown.

3. Stenoderma falcatum.

Arctibeus falcatus, *Gray, Ann. Nat. Hist.* 1839, p. 1.
Phyllostoma albomaculatum, *Gundlach, MB. Akad. Berl.* 1861, p. 155.
Phyllops falcatus, *Peters, MB. Akad. Berl.* 1876, p. 433.

Ears, nose-leaf, and general external form as in *S. achradophilum*, with which it also agrees closely in size.

The frontal between the supraorbital ridges is flattened, not deeply concave as in *S. rufum*, and the palate is angularly emarginate as far forwards as a line joining the centres of the first upper molars of opposite sides, the sides of the emargination converging forwards and forming an angle. The antepenultimate or second upper molar is scarcely three fourths the size of the first molar, while the corresponding teeth in *S. rufum* and *S. achradophilum* are nearly equal in their antero-posterior diameters. The third upper molar is even smaller than the corresponding tooth in the lower jaw, and is placed close behind the second molar to the inner side of the tooth-row (Plate XXVIII. figs. 3, 3 *a*).

Length (of the type specimen), head and body 1″·9, head 0″·75, ear 0″·6, tragus 0″·23, forearm 1″·65, thumb 0″·4; third finger—metacarp. 1″·5, 1st ph. 0″·65, 2nd ph. 0″·8, 3rd ph. 0″·45; fourth finger—metacarp. 1″·5, 1st ph. 0″·5, 2nd ph. 0″·5; fifth finger—metacarp. 1″·5, 1st ph. 0″·45, 2nd ph. 0″·5; tibia 0″·6, foot 0″·4.

Hab. Cuba.

The arched condition of the index finger outwards, from which this species has derived its specific name, although more or less

present in every species of the genera allied to *Artibeus*, and therefore not to be depended upon as a distinguishing character, appears to be, however, much more marked in this species than in any other, the membrane between the index finger and the metacarpal bone of the third finger being 0·4 inch wide in the centre.

a. ♂ imm., al. (type). Cuba. W. S. MacLeay, Esq. [P.].

26. AMETRIDA.

Ametrida, *Gray, Ann. & Mag. Nat. Hist.* xix. p. 407 (1847).

Muzzle exceedingly short and broad, crown of the head greatly elevated above the face-line; ears, nose-leaf, and chin-warts as in *Stenoderma*.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Teeth very similar to those of *Stenoderma*; palate wider and shorter; horizontal plate of the palate-bones deficient behind.

This genus, founded on a single species, differs mainly from *Stenoderma* in the great elevation of the crown of the skull above the short and very broad facial portion. Although this seems to be a very important character, I think it doubtful, considering the great similarity in the dentition and in other respects, whether *Ametrida* can be recognised as more than a subgenus of *Stenoderma*.

1. Ametrida centurio.

Ametrida centurio, *Gray, Ann. & Mag. Nat. Hist.* xix. p. 407 (1847); *Peters, MB. Akad. Berl.* 1866, p. 396.

Phyllostoma centurio, *Wagner, Suppl. Schreb. Säugeth.* v. p. 629 (1855).

Head very short and broad, and, owing to the shortness of the neck, appears to rest between the shoulders; face flattened in front; the opening of the mouth almost wholly anterior, the lower jaw projecting beyond the upper in front; crown of the head greatly elevated above the face-line; eyes large, prominent; ears separate, shorter than the head, in general form as in *Stenoderma*, the tip rounded off, the outer margin concave below the tip, then convex again, concave opposite the base of the inner margin of the tragus, terminating in a long rounded lobe midway between the base of the outer margin of the tragus and the inferior margin of the eye, below which a small wart is placed; tragus straight, acutely pointed, the outer margin with four prominent tooth-like projections: nose-leaf as in *Stenoderma*, but comparatively broader and shorter, the front margin of the horseshoe slightly raised, the erect terminal leaf nearly as broad as the horseshoe in the centre, abruptly narrowing above and terminating in an acute point; between the postero-external margin of the horseshoe and the eye, on each side, a prominent obliquely placed glandular process, on the summit of which the openings of three pores are seen; chin with a small cen-

tral longitudinal wart bounded laterally and inferiorly by seven smaller warts; inner margin of the lips with conical papillæ as in *Artibeus* (Plate XXX. fig. 2).

Thumb long and strong, first phalanx nearly three times as long as the metacarpal bone; first phalanx of the middle finger two thirds the length of the second phalanx; wings from the base of the toes; calcaneum shorter than the foot; interfemoral deeply emarginate behind, but nearly as much developed as in *Artibeus perspicillatus*.

On the inferior surface of the thorax, in the centre, slightly posterior to a line drawn between the mammæ, a peculiar transverse elevation exists, at the extremities of which a small projection appears at each side like a teat, from the end of which long hairs arise. This is probably a glandular organ (Plate XXX. fig. 2).

Fur soot-brown; a conspicuous white spot on each shoulder at the origin of the antebrachial membrane.

Upper incisors feeble, as in *Stenoderma falcatum*, forming a semicircular row, filling up by their bases the wide space between the canines; inner incisors moderately long, directed vertically downwards, conical and acutely pointed; outer incisors very short and blunt, scarcely equalling in vertical extent the cingulum of the canines; lower incisors very small, equal, with crowns deeply grooved from before backwards; first upper premolar short, equal to half the canine in vertical extent; second premolar as long as the canine, and broader at the base; lower premolars nearly equal to the canine in vertical extent, the second slightly exceeding the first; molars as in *Stenoderma rufum*, but narrower.

Length (of the type specimen, an adult ♀), head and body 1″·7, head 0″·65, ear 0″·6, tragus 0″·2, forearm 1″·3, thumb 0″·4; third finger—metacarp. 1″·2, 1st ph. 0″·45, 2nd ph. 0″·7, 3rd ph. 0″·55; fourth finger—metacarp. 1″·05, 1st ph. 0″·5, 2nd ph. 0″·6; fifth finger—metacarp. 1″·1, 1st ph. 0″·45, 2nd ph. 0″·55; tibia 0″·65, calcaneum 0″·22, foot 0″·4.

Hab. Brazil.

a. ♂ ad., al.	Para.	J. P. G. Smith, Esq. [P.].

27. CHIRODERMA.

Chiroderma, *Peters*, *MB. Akad. Berl.* 1860, p. 747.

Like *Vampyrops* generally in external characters, but the muzzle is shorter, the interfemoral membrane much more developed, and the number and character of the teeth different.

Dentition. Inc. $\frac{4}{4}$ or $\frac{4}{2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{2-2}{2-2}$ or $\frac{2-2}{3-3}$.

Upper middle incisors slender, with oblique cusps directed inwards and forwards; the first upper premolar with a very oblique cusp directed forwards; second molar in both jaws larger than any of the other teeth.

Skull with a deep cleft between the nasal bones leading back-

wards from the nasal opening as far as the space between the orbits* (see Plate XXIX. fig. 3 *b*).

Range. Mexican and Brazilian Subregions.

This genus is undoubtedly closely allied to *Vampyrops*, as the form of the tragus, the muzzle and nose-leaf, and the well-marked facial streaks show. The form of the upper and lower first premolars is, however, very different and peculiar (see Plate XXIX. figs. 2, 3); the second molar in both jaws is larger than any of the other teeth; and in immature specimens of the different species a well-defined cleft extends backwards from the nasal opening in the middle between the orbits. (See description of skull of *Chiroderma villosum*, p. 534.)

Synopsis of the Species.

I. Inc. $\frac{4}{4}$, m. $\frac{2-2}{2-2}$; no white line along the spine.
- *a*. First lower premolar nearly flat-crowned, without a distinct cusp.
  - *a'*. Four broad very distinct white streaks on the head; forearm 2″ ..... 1. *Ch. salvini*, p. 532.
- *b*. First lower premolar with a distinct anterior cusp.
  - *b'*. Second lower molar nearly double the first molar in antero-posterior diameter; head-streaks narrow; forearm 1‴·85 or more.. 2 *Ch. villosum*, p. 534.
  - *c'*. Second lower molar about one half greater than the first in antero-posterior diameter; head-streaks broad; forearm 1‴·4..... 3. *Ch. pusillum*, p. 535.

II. Inc. $\frac{4}{2}$, m. $\frac{2-2}{3-3}$; a white line along the spine.
- *a*. Four broad very distinct streaks on the head; forearm 1‴·4..... 4. *Ch. bidens*, p. 535.

1. Chiroderma salvini.

Head, ears, and nose-leaf like those of *Artibeus perspicillatus*, but the muzzle is proportionately narrower in front; the distance between the eyes is considerably greater than the distance of the eye from the end of the muzzle; eyes large; ears equal in length to the distance of the anterior termination of the outer margin of the ear-conch from the extremity of the muzzle; horseshoe-shaped nose-leaf nearly circular, free in front and laterally, with a slight convexity forming a small projection from the centre of its anterior margin.

The body is short in proportion to the length of the forearm and extent of the wings. Wing-membrane extending to the metatarsus; interfemoral well developed, its posterior margin but slightly concave, the centre of the membrane extending as far back as a line drawn between the ankles; feet small.

* This opening between the nasal bones probably becomes closed in some species when the animal is full-grown, for in a specimen in the Leyden Museum no cleft was found on examination by Dr. Peters (MB. Akad. Berl. 1866, p. 393).

Head with four very broad and very white streaks; no streak along the spine. Fur moderately long and dense. Above tricoloured, brown at the base, then pale yellowish brown, the terminal fourth of the hairs dark brown; beneath brown, the extreme tips ashy. The humerus and muscular part of the forearm are well covered; the greater part of the antebrachial membrane is naked; on the wing-membrane the fur extends rather densely as far as a line drawn from the elbow to the knee; the whole interfemoral is covered with soft fur, which thins out towards its posterior margin; the legs and feet are clothed with short hairs. At the base of the thumb some short light brown hairs.

Upper middle incisors slender, unicuspidate, rather long and acutely pointed, each tooth separated by its base from the opposite tooth, but with its cusp directed obliquely inwards, so as to approach it near its extremity (Plate XXIX. fig. 3 *a*); each outer incisor very small, in the centre of the space between the inner incisor and the canine; first upper premolar small, with a single very oblique cusp directed forwards, so as to touch the base of the canine by its anterior side, posteriorly the tooth is separated from the second premolar by a space; second upper premolar with a straight cusp, like that of a small canine, and a small posterior and external basal projection; second (last) upper molar about a third larger than the first, both molars with a pair of cusps externally, with concave crowns internally not so broad as in *Artibeus*, and without internal projections; lower incisors very small, slightly grooved on their crowns; first lower premolar with an almost flat oval crown but slightly raised above the gum; second and last molar very large, nearly double the antero-posterior diameter of the first molar and almost three times its size, with a concave crown margined by five blunt elevations (Plate XXIX. fig. 3).

The distance between the outer cusps of the last molars in the upper jaw is slightly greater than the distance from one of the middle upper incisors to the posterior edge of the last molar.

The nasal opening is prolonged backwards by a very distinct narrow cleft as far as a line corresponding to the anterior margin of the orbit (Plate XXIX. fig. 3 *b*).

Length, head and body 2″·8, interfemoral membrane in the middle 0″·7, head 1″·15, ear 0″·7, tragus 0″·25, nose-leaf 0″·45 × 0″·3, forearm 2″, thumb 0″·4; third finger—metacarp. 1″·8, 1st ph. 0″·75, 2nd ph. 1″·05, 3rd ph. 0″·8; fourth finger—metacarp. 1″·75, 1st ph. 0″·6, 2nd ph. 0″·7; fifth finger—metacarp. 1″·75, 1st ph. 0″·5, 2nd ph. 0″·6; tibia 0″·65, calcaneum 0″·25, foot 0″·4.

Hab. Costa Rica.

The white streaks on the head appear to be, in this species, wider and more distinct than in any other species of this group. The form of the first lower premolar, the large size of the interfemoral membrane, and the smallness of the feet at once distinguish the species.

a. ♂ ad., al. (type). Costa Rica. O. Salvin, Esq. [C.].

2. Chiroderma villosum.

Chiroderma villosum, *Peters, MB. Akad. Berl.* 1860, p. 748.

Ear-conch as in *Artibeus perspicillatus*; nose-leaf also nearly similar, smaller, and circular in front; a faint white streak on each side above the eye from the nose-leaf to the ear, no white line along the spine.

Fur moderately long, pale yellowish brown above, with darker brown extremities; beneath darker brown, the extreme tips greyish. Above, three fourths the forearm is thickly covered, also portion of the wing-membrane posterior to it, and along the sides of the body as far outwards as a line drawn from the elbow to the knee, also upon the legs and interfemoral membrane, thinning out towards the ankles, and thinly upon the posterior margin of the interfemoral and upon the backs of the feet.

Interfemoral membrane about as large as in *Artibeus perspicillatus*, but much more densely clothed with hair. Wing-membrane extending to the metatarsus.

Skull broadly conical in front, the width between the outer edges of the posterior upper molars slightly exceeds the length of the tooth-row, measured from the inner incisor to the posterior margin of the last molar. Frontal bones flat, with very short postorbital processes; nasal aperture continued backwards by an oval slit, which reaches as far backwards as a line drawn between the most anterior parts of the bony orbits; bony palate continued as far backwards as the posterior third of the zygoma.

Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{2-2}{2-2}$.

Upper middle incisors slender, unicuspidate, their oblique cusps directed inwards towards the middle line and close together by their extremities; outer incisors unicuspidate, conical, slightly exceeding the cingulum of the canine, not filling up the space between the canine and the middle incisors; first upper premolar small, with a very oblique cusp directed forwards and touching the canine, but separated from the second large premolar by a space; last upper molar exceeding the first in size; lower incisors equal, not crowded, not grooved; first lower premolar with a broad base, the cingulum projecting considerably behind, forming a small posterior cusp; second with a broad base and a long slender anterior cusp; last molar nearly double the length of the antepenultimate molar, with a flat crown margined by five small cusps (Plate XXIX. figs. 2, 2 *a*).

Distance between outer edges of posterior upper molars 0″·52, distance between summits of cusps of canines 0″·2, length of upper tooth-row 0″·5.

Length, head and body about 2″·4, interfemoral membrane in the middle 0″·3, ear 0″·65, forearm 2″, thumb 0″·5; third finger—metacarp. 1″·9, 1st ph. 0″·8, 2nd ph. 1″·1, 3rd ph. 0″·8; fifth finger—metacarp. 1″·9, 1st ph. 0″·5, 2nd ph. 0″·65; tibia 0″·7, calcaneum 0″·35, foot 0″·5.

The above measurements have been taken from a skin and skull

from Minas Geraes in the Collection, and are slightly larger than those of the type specimen.

Hab. Brazil.

a. ad. sk. Minas Geraes.
b. skull of *a*.

3. Chiroderma pusillum.

Phyllostoma pusillum, *Wagner, Abhandl. Münch. Akad.* v. p. 173 (1843); *Suppl. Schreb. Säugeth.* v. p. 634 (1855).
Chiroderma pusillum, *Peters, MB. Akad. Berl.* 1866, p. 395.

Much smaller than the preceding species, and with four very distinct white streaks on the head.

Wing-membrane from the base of the toes; interfemoral membrane very deeply concave behind.

Upper middle incisors separated at their bases and directed obliquely inwards, each tooth with a broader cusp than in either of the preceding species, and on its outer side near its extremity a blunt projection; the other incisors as in *Ch. villosum*; first upper and lower premolars with broad bases, each with an oblique, anteriorly directed, acutely pointed cusp; last lower molar one half greater than the first in antero-posterior diameter.

The skull of the adult, as shown by Dr. Peters, has not the cleft between the nasal bones which is present in all other species of the genus.

Length, head and body about 2″, forearm 1″·4, thumb 0″·44; third finger—metacarp. 1″·25, 1st ph. 0″·52, 2nd ph. 0″·7, 3rd ph. 0″·5; fourth finger—metacarp. 1″·23, 1st ph. 0″·48, 2nd ph. 0″·5; fifth finger—metacarp. 1″·24, 1st ph. 0″·33, 2nd ph. 0″·36; tibia 0″·5, foot 0″·4.

The above measurements are taken from a specimen in the Leyden Museum, referred to by Dr. Peters in MB. Akad. Berl. 1866, p. 393.

Hab. Brazil.

4. Chiroderma bidens.

Ears as in *Ch. pusillum*; nose-leaf rather narrow and long, the lancet-shaped leaf with a very prominent central longitudinal ridge, which is produced upwards and terminates the leaf in a narrow needle-shaped projection; horseshoe small, almost quite circular, front margin distinct from the muzzle.

First phalanx of the middle finger one third the length of the metacarpal bone, and slightly more than half the second phalanx; metacarpals of the last two fingers equal in length, slightly shorter than the metacarpal of the middle finger. Wings from the metatarsi; interfemoral membrane moderately deep behind, the emargination behind not extending further forwards than a line drawn from the middle of one tibia to the other.

Fur moderately long and dense; on the upper surface dark brown,

the basal three fourths of the hairs pale shining brown; beneath, greyish brown. On the face four very distinct longitudinal white bands—two superior extending from either side of the posterior margin of the base of the nose-leaf directly backwards to the back of the head; two inferior passing backwards along the upper lip and below the eyes to the ears. On the back a narrow but distinct white stripe commences at the back of the head and extends along the spine to the termination of the fur behind.

The fur of the body extends upon the back of the forearm and adjacent wing-membrane for more than half its length, and upon the wing-membrane almost as far outwards as a line drawn from the elbow to the knee; the interfemoral, the legs, and the feet are almost quite naked.

Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{2-2}{3-3}$.

Upper incisors as in *Ch. pusillum*, the extremities of the central incisors slightly notched, the two lower incisors faintly grooved; premolars also as in *Ch. pusillum*; second upper molar scarcely larger than the first molar; third lower molar very small and circular (not discernible without the aid of a lens), placed directly behind and close to the second molar.

Length, head and body 2″·25, ear 0″·55, nose-leaf 0″·35, forearm 1″·4, thumb 0″·45; third finger—metacarp. 1″·4, 1st ph. 0″·5, 2nd ph. 0″·8, 3rd ph. 0″·45; fourth finger—metacarp. 1″·3, 1st ph. 0″·4, 2nd ph. 0″·55; fifth finger—metacarp. 1″·3, 1st ph. 0″·3, 2nd ph. 0″·45; tibia 0″·5, foot 0″·4.

Hab. Peruvian Amazons.

a. ♀ ad. sk.	Huallaga.	E. Bartlett [C.].

28. PYGODERMA.

Pygoderma, *Peters, MB. Akad. Berl.* 1865, p. 357.

Muzzle very short and much thickened in a vertical direction; ears and nose-leaf generally as in *Artibeus*; interfemoral membrane short.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{2-2}{2-2}$.

General character of the teeth as in *Stenoderma*, but the last molars in both jaws (corresponding to the large second molars in other genera of *Stenodermata*) reduced to a very small size; facial bones greatly expanded laterally and vertically.

1. Pygoderma bilabiatum.

Phyllostoma bilabiatum, *Wagner, Wiegm. Archiv*, 1843, p. 366; *Burmeister, Thiere Brasiliens, Säugeth.* p. 47 (1854).
Arctibeus leucomus, *Gray, P. Z. S.* 1848, p. 57.
Stenoderma (Pygoderma) microdon, *Peters, MB. Akad. Berl.* 1863, p. 83.

Muzzle short and very thick; nose-leaf higher than broad,

lanceolate, the front edge of the horseshoe bound down to the muzzle; ear-conch and tragus as in *Artibeus cinereus*; eyes large, not concealed. From either side of the front margin of the nose-leaf a slightly raised, very narrow, but well-defined ridge passes backwards to the angle of the mouth, appearing like the margin of an upper lip, below this ridge the fur of the face does not pass; lower lip with a central wart, margined on either side by a similar wart, and five small warts in a semicircle beneath (Plate XXX. fig. 3).

Interfemoral membrane circularly emarginate behind, about 0·3 inch deep in the middle; wings from the metatarsus close to the base of the toes.

Fur moderately long and dense; above, dark brown at the base, then pale buff, the extremities of the hairs dark brown; beneath, greyish brown throughout; on each shoulder, at the origin of the antebrachial membrane, a small patch of white hairs. On the upper surface the fur extends thickly outwards upon the forearm to within a short distance from the carpus, ending rather abruptly, densely clothing the wing-membrane behind the humerus and forearm, extending more thinly upon the legs to the ankles and upon the adjoining wing-membrane; the interfemoral membrane is well covered with moderately long hairs, which form a fringe along its posterior margin; the proximal third of the last metacarpal is clothed with hair.

Facial bones greatly enlarged vertically, forming large rounded eminences above the orbits with a broad flattened intervening space above, behind which the crown of the skull is slightly elevated (Plate XXVIII. fig. 4*b*); incisors as in *Ametrida*, the central incisors unicuspidate, triangular, directed vertically downwards, the cingulum of each tooth with a small basal projection externally; outer incisors scarcely elevated above the gum, flat-crowned, filling the space between the canines and the inner incisors; upper premolars nearly equal in size, almost equal to the canine in transverse section and equalling three fourths its vertical extent; first upper molar slightly larger than the second premolar in cross section; second molar minute, similar in form and size to the outer upper incisors (Plate XXVIII. figs. 4, 4*a*); lower incisors equal, deeply grooved above and in front, placed in a straight line between the canines; lower premolars equal to the upper, with posterior basal projections; first lower molar larger than the second premolar in cross section, flat, with acute projections along its inner edge; last lower molar scarcely one third the size of the first molar (Plate XXVIII. fig. 4).

Length, head and body 2″·4, nose-leaf 0″·5 × 0″·28, ear 0″·7, tragus 0″·28, forearm 1″·5, thumb 0″·5; third finger—metacarp. 1″·4, 1st ph. 0″·65, 2nd ph. 1″, 3rd ph. 0″·5; fourth finger—metacarp. 1″·4, 1st ph. 0″·45, 2nd ph. 0″·7; fifth finger—metacarp. 1″·45, 1st ph. 0″·45, 2nd ph. 0″·6; tibia 0″·65, foot 0″·45.

Hab. Mexico; Brazil.

a. ad. sk.	Brazil.	Purchased.

(Type of *Arctibeus leucomus*, Gray.)

29. STURNIRA.

Sturnira, *Gray, Ann. & Mag. Nat. Hist.* x. p. 257 (1842).
Nyctiplanus, *Gray, P. Z. S.* 1848, p. 57.

Muzzle short and conical; nose-leaf and ears as in *Artibeus*; chin with three warts in front, margined below by smaller warts in a semicircular series; tail none; calcaneum indistinct; interfemoral membrane very narrow; wing-membrane extending to the ankles.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Upper middle incisors unicuspidate, oblique; molars rather narrow and longitudinally grooved, their longitudinal equalling their transverse diameters; last molar in both jaws small.

This genus differs from all the genera of *Stenodermata* in its longitudinally grooved molars, and resembles *Brachyphylla* alone in the conical shape of the muzzle.

The molars resemble those of the frugivorous *Pteropi* more closely than those of any other Bats; and the only known species, *S. lilium*, no doubt lives chiefly if not altogether on fruit, though Tschudi ('Fauna Peruana'), while describing its frugivorous habits, remarks that a specimen was caught in the act of sucking the face of a drunken Indian sleeping under a plantain tree. It is very probable, however, that the truly sanguivorous *Desmodus rufus*, which this species resembles closely in the colour of the fur and in general external form, was mistaken for it.

In the presence of tufts of longer and differently coloured hairs over glands on the sides of the neck in the males of *S. lilium* (*Ph. erythromos*, Tschudi, and *Ph. chrysocomos*, Wagner), another point of resemblance to the frugivorous *Pteropi* may be observed, which is even more remarkable than the form of the teeth, as the latter is evidently the result of adaptative changes.

1. Sturnira lilium.

Phyllostoma lilium, *Geoffroy, Ann. du Mus.* xv. p. 181; *Wagner, Suppl. Schreb. Säugeth.* i. p. 411, v. p. 631.
Phyllostoma spiculatus, *Illiger, Lichtenst. Verz. der Doubl.* p. 3.
Sturnira spectrum, *Gray, Ann. & Mag. Nat. Hist.* 1842, p. 257; *Voyage 'Sulphur,' Mammal.* p. 22, pl. vi. fig. 1 (1844).
Phyllostoma excisum, *Wagner, Wiegm. Archiv*, 1842, p. 358.
Phyllostoma albescens *et* fumarium, *Wagner, Abhand. Münch. Akad.* v. p. 178 (vide *Peters, MB. Akad. Berl.* 1865, p. 524).
Phyllostoma erythromos *et* oporaphilum, *Tschudi, Fauna Peruana*, p. 64, pls. i. & ii. (1844–46).
Stenoderma chilense, *Gervais, Gay, Hist. de Chili, Mammal.* p. 30, pl. i. fig. 1 (1847).
Nyctiplanus rotundatus, *Gray, P. Z. S.* 1848, p. 57.
Phyllostoma chrysocomos, *Wagner, Suppl. Schreb. Säugeth.* v. p. 635 (1855).
Sturnira lilium *et* chilensis, *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 39, pl. viii. fig. 5, and pl. ix. figs. 5 & 6 (1855); *Peters, l. c.*

Muzzle short, obtusely conical; nostrils opening in the centre of the horizontal portion of the nose-leaf, the front edge of which is straight and continuous with the integument of the muzzle beneath, separated by a rather wide space from the margin of the lip; vertical portion of the nose-leaf ovate-lanceolate, arising by a narrow stalk between the nasal orifices, then convex on the sides and narrow lanceolate in the upper third (Plate XXX. fig. 4, front of muzzle, enlarged); immediately behind the nose-leaf on either side in front of the eyes a prominent obliquely situated glandular elevation is placed. Ears much shorter than the head, narrow, and narrowly rounded off or subacutely pointed at the tips; upper half of the outer margin of the conch straight, the lower half convex, slightly notched opposite the middle of the tragus, terminating opposite the base of the inner margin: the tragus reaches its greatest width opposite the base of its inner margin; the outer margin immediately above that point is notched, then slants upwards and inwards; the inner margin is straight, the tip truncated, and terminating in three small points. Inner margins of the lips fringed with very distinct papillæ, as in *Artibeus*; lower lip with three warts in front, whereof the central is largest, bounded laterally and beneath by a row of small warts (Plate XXX. fig. 4).

Wing-membrane extending to the ankles; interfemoral membrane rudimentary, forming a narrow band along the legs and extremity of the body; tail none; calcaneum indistinct.

Fur moderately long and dense; on the upper surface extending forwards upon the muzzle as far as the base of the nose-leaf; also upon the humerus and half the forearm, but leaving the antebrachial membranes naked; posteriorly, the hinder extremities and the narrow interfemoral membrane are covered with fine rather long fur, which also clothes the backs of the feet; on the wing-membranes the fur extends as far as a line drawn from the elbow to the knee, and on a small portion external to the tibia; beneath, the antebrachial membrane, the forearm, and the wing-membrane posterior to the forearm are clothed with fine hairs, and the fur of the body extends for a short distance upon the wing-membrane.

Colour of the fur variable and different according to sex and age. In the adult male the head, neck, and shoulders are generally yellowish brown, the back and extremities dark brown with reddish tips, base of the hairs yellowish white; between the head and the point of origin of the antehumeral membrane, on either side of the neck, a bunch of longer and more closely set hairs of a brownish-red colour with golden-red tips; beneath greyish brown, slightly washed with reddish; throat paler. In the adult female the head, neck, and shoulders are greyish brown, on the back and extremities dark brown, the base of the hairs darker than in the male; beneath, paler throughout, and whitish with a reddish tinge towards the centre of the body.

Incisors like those of *Carollia brevicauda*; the central upper incisors unicuspidate, with oblique cusps; the outer incisors short and broad, their anterior surface concave, their summits broadly

conical, on each side and close to the inner incisor, and also lying partly against the inner side of the front surface of the base of the canine; lower incisors equal or the middle incisors slightly larger with straight faintly notched cutting-edges; first upper premolar exceeding the second in antero-posterior diameter at the base, but less than it in vertical extent; last molar scarcely one third the size of the antepenultimate molar, with an oval crown of which the longer diameter is transverse; first lower premolar considerably exceeding the second in size, but equal to it in vertical extent; last lower molar about equal to the last upper, but its longer diameter is placed in the direction of the jaw; inner three fourths of the crowns of the molars longitudinally concave, the outer one fourth forming a notched cutting-edge (Plate XXVIII. fig. 5, upper jaw).

Length (of an adult ♂), head and body 2″·4, head 0″·9, ear 0″·7 × 0″·4, tragus 0″·28, nose-leaf 0″·35 × 0″·22, forearm 1″·7, thumb 0″·45; third finger—metacarp. 1″·55, 1st ph. 0″·6, 2nd ph. 0″·75, 3rd ph. 0″·7; fourth finger—metacarp. 1″·6, 1st ph. 0″·5, 2nd ph. 0″·6; fifth finger—metacarp. 1″·6, 1st ph. 0″·35, 2nd ph. 0″·5; tibia 0″·65, foot 0″·5.

Hab. Neotropical Region (tropical and subtropical parts, apparently generally distributed).

a. ad. sk.	Jamaica.	P. H. Gosse, Esq. [C.].
b. ad. sk.	Jamaica.	J. Gould, Esq. [P.].
c. ad. sk.	Honduras.	Mr. Dyson [C.].
d. ♂ ad., al.	Pernambuco.	J. P. G. Smith, Esq.
e, f. ad. sks.	Bahia.	Comte de Castelnau [P.].
g–i. ad. sks.	Rio Janeiro.	Earl of Derby [P.].
j–q. ad sks.	Sta. Catherina.	Purchased.
r, s. ad. sks.	Minas Geraes.	
t. ad. sk.	Brazil.	Purchased.
u. ad. sks.	Brazil.	Purchased.
v. ♂ ad., al.	Brazil.	
w. ad. sk.	Rio Napo, Brazil. (With very dark-coloured fur.)	Purchased.
x. ad. sk.	Huallaga.	Mr. Bartlett [C.].
y–a′. ad. sks.		Earl of Derby [P.].
b′. ad. sk.		St. George Mivart [P.].
c′. skull of *c.*		
d′. skull of *e.*		
e′. skull.	No history.	

30. BRACHYPHYLLA.

Brachyphylla, *Gray, P. Z. S.* 1833, p. 123; *Mag. Zool. & Bot.* ii. p. 489 (1838).

Muzzle conical, longer and narrower than in other genera of this group; nose-leaf small, near the extremity of the muzzle, bounded posteriorly and laterally by a deep groove: nasal apertures uncovered, in the centre of the nose-leaf; ears as in *Phyllostoma*; lower lip with a V-shaped groove in front margined by warts; inner margins of the lips with few conical papillæ; interfemoral membrane well

developed; tail none; calcaneum very short or wanting; wing-membrane extending to the distal extremity of the tibia; feet quite free.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{3-3}{3-3}$.

Upper middle incisors triangular; molars very broad and hollow-crowned; the last molar in both jaws well developed.

This genus resembles *Phyllostoma* in the form of the head externally, and in the comparative absence of conical papillæ fringing the lips internally, but agrees with other genera of *Stenodermata* in the peculiar shape of the molar teeth and in the absence of a tail. The upper middle incisors in *B. cavernarum* are very similar in shape to those of *Desmodus rufus*, though much smaller, and differ in shape from those of every other species of the group; and the form of the nose-leaf, and of the lower lip in front, as well as the structure of the stomach (to some extent) also appear to connect it with the *Desmodontes* (see p. 545).

1. Brachyphylla cavernarum.

Brachyphylla cavernarum, *Gray, P. Z. S.* 1833, p. 123; *Ann. Nat. Hist.* iv. p. 2, pl. i. fig. 1 (1839).

Stenoderma cavernarum, *Blainville, Ostéographie*, pl. vii. (skull); *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 33 (1855).

Head very slightly raised above the face-line; muzzle conical, rather narrow in front, the distance between the eyes exactly equal to the distance of the eye from the end of the muzzle; ears shorter than the head, the ear-conch and tragus very similar in shape to those of *Phyllostoma hastatum*, but the upper half of the outer margin of the tragus has two additional small tooth-like projections; nose-leaf small, nearly circular, the front margin bound down to the muzzle, the sides and upper margin free, the latter slightly bent forwards and emarginate in the middle: behind the nose-leaf and on each side is a deep groove bounded by a narrow naked glandular elevation; lower lip with a V-shaped groove in front bounded by a naked elevation on either side, which is fringed externally by five small warts (Plate XXX. figs. 5, 5 *a*).

Thumb well developed, slightly shorter than the foot; first phalanx of the middle finger one third the length of the metacarpal bone; wings from the distal extremity of the tibia; interfemoral membrane extending as far backwards in the centre as a line corresponding to the commencement of the distal third of the tibia, and laterally as far as the sides of the feet; feet large and strong; wing-membrane between the humerus and femur, with numerous small raised papillæ arranged in close parallel lines.

Above reddish brown, the base of the hairs paler; beneath much paler. The fur of the body scarcely extends upon the membranes, and the forearms are naked; the interfemoral has a few very fine hairs, which also extend along the legs to the backs of the feet. The face is well covered, and long hairs surround the eyes.

Upper middle incisors moderately large, unicuspidate, triangular; outer incisors very small, flat-crowned (Plate XXX. fig. 5 *b*); lower incisors equal, close together, their longest diameter at right angles to the direction of the jaws, their cutting-edges unnotched; upper canine with a prominent posterior basal projection; first upper premolar very small, but slightly larger than one of the outer upper incisors, the second equals three fourths the canine; molars very broad, with concave crowns and prominent notched outer and inner cutting-edges; the central molars largest, the last upper and lower molars but slightly smaller than the first.

The œsophagus is very narrow, and enters the stomach close to the pyloric extremity; the cardiac portion of the stomach is expanded upwards and to the left side; the pyloric muscular constriction is not well defined; the intestine measures about 20 inches in length.

Length, head and body 3″·3, head 1″·3, ear 0″·8 × 0″·5, tragus 0″·35, nose-leaf 0″·2 × 0″·25, forearm 2″·5, thumb 0″·65; third finger—metacarp. 2″·1, 1st ph. 0″·65, 2nd ph. 0″·9, 3rd ph. 0″·7; fourth finger—metacarp. 1″·95, 1st ph. 0″·6, 2nd ph. 0″·85; fifth finger—metacarp. 2″·1, 1st ph. 0″·55, 2nd ph. 0″·6; tibia 1″, foot 0″·75.

Hab. West Indies (Cuba; St. Vincent's).

a. ♂ ad., al. (type).	Cuba.	W. S. MacLeay, Esq. [P.]
b. ♂ ad., al.	St. Vincent's.	
c. ♀ ad., al.	West Indies.	

31. CENTURIO.

Centurio, *Gray, Annals & Mag. Nat. Hist.* x. p. 259 (1842).

Muzzle even shorter and broader than in *Ametrida*, the crown of the head much raised above the face-line; face naked; no distinct nose-leaf, but the nostrils open in a concavity at the extremity of the muzzle, bounded by raised cutaneous edges; upper lip divided in the centre, the reflected margins continuous above with the sides of the concavity, in which the nostrils open; ear-conch deeply divided internally; under surface of the lower jaw and throat with transverse cutaneous bands.

Dentition. Inc. $\frac{4}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{2-2}$, m. $\frac{2-2}{2-2}$.

Teeth as in *Ametrida*, the last upper molar but slightly smaller than the first.

According to the form of the skull and teeth, this genus is most closely related to *Ametrida* and *Stenoderma*, and the white shoulder-spots further indicate its affinity to these genera. The absence, however, of a distinct nose-leaf, the very peculiar form of the face, the presence of gular bands and pouches, and the structure of the wing-membrane, render the genus so distinct from all others, that it is probably more properly placed at the end of the group.

1. Centurio senex.

Centurio senex, *Gray, Ann. & Mag. Nat. Hist.* x. p. 259 (1842); *Voyage of the 'Sulphur,' Mammalia*, pp. 26, 27, pl. viii. figs. 1, 1*a* (1844).

Centurio flavogularis, *Lichtenstein et Peters, MB. Akad. Berl.* 1854, p. 335.

Centurio mexicanus, *De Saussure, Rev. et Mag. Zool.* 1860, p. 381.

? Centurio (Trichocorytes) m'murtrii, *Allen, Proc. Acad. Nat. Sci. Philad.* 1861, p. 360 *.

Muzzle extremely short, so short that the eyes are almost at the anterior extremity of the head, and very broad; the distance between the eyes is nearly equal to half the length of the head, and the opening of the mouth is altogether anterior; the lower jaw projects in front beyond the upper; on the face the naked skin is stretched tightly round the projecting eyes; the upper lip is divided in front, and the reflected edges are continuous above on either side with the elevated margins of a depression in which the nostrils open, and are separated by a flat, straight-sided, naked elevation; above this and between the eyes are two pits arranged transversely, with raised, thickened, and sharply cut margins, higher behind and internally, where they form the antero-lateral boundaries of a central deeper cell, behind which the forehead has a flattened, posteriorly rounded elevation in the centre. (These ridges and processes will be better understood by reference to Plate XXX. fig. 6.)

Ears shorter than the head; inner side of the ear-conch divided near the middle by a deep acutely angular notch, which cuts off as an oblong lobe half the inner side of the conch; outer side straight above, slightly convex lower down, emarginate opposite the tragus, terminating in a thickened triangular antitragus with a narrow cartilaginous process; tragus small, with a straight inner and a convex toothed outer margin. Under surface of the lower jaw and neck banded by three narrow folds of integument extending round from the bases of the ears; the first commences on each side at the anterior margin of the antitragus and passes down near the angle of the mouth, forming in its middle third a wide and flattened band, having its posterior margin sinuate and divided into three projections; the second band commences behind the first, but is less distinct at its origin, and in the centre beneath forms a small round cell; the third band is close behind this one, and has a small wart on each side bounding its middle third †.

* I have not yet had an opportunity of examining the single specimen of *C. m'murtrii* which is preserved in the collection of the Smithsonian Institute at Washington. It was sent from Mirador in Mexico along with specimens of *Centurio senex*, and I have little doubt that it represents the male of this species, of which females alone appear to have been hitherto obtained. (See footnote below.)

† Such are the characters of the throat-bands in the adult female; they represent, I believe, but the rudimentary condition of certain structures occupying the same position in the male, of which probably the nearest representatives are found in the great gular and thoracic pouch and glandular organs of

Thumb longer than the foot. Wings as in *Stenoderma*, but the membrane between the fourth and fifth fingers is very curiously marked by narrow transverse parallel bands of a dark colour, of which about twenty-five may be counted; also beyond the fifth finger, for a distance of about half an inch inwards, similarly directed, but double, bands traverse the wing-membrane.

Wings extending to the metatarsus; calcaneum rather more than half the length of the foot; interfemoral membrane well developed, angularly but not deeply emarginate behind, the emargination extending slightly above the middle of the tibiæ.

Fur yellowish brown, the extremities of the hairs greyish; a conspicuous white spot on each shoulder at the origin of the antebrachial membrane; wing-membrane between the humerus and femur, and the interfemoral above, thinly clothed with soft fur.

Upper middle incisors with a broad base and a very short cusp, scarcely exceeding in vertical extent the outer incisors, which have oblique cusps directed inwards; first upper premolar short, triangular; the second premolar nearly equals the canine, and is in a plane but slightly posterior to it; upper molars very broad, the conjoined antero-posterior diameter scarcely equal to the transverse diameter of the first molar, the second molar but slightly smaller than the first; lower incisors extremely small, grooved; first lower premolar about half the size of the second, and three fourths its vertical extent, with a straight triangular cusp; second lower molar about half the size of the first molar, triangular in cross section at its base.

Length (of the type, an adult ♀), head and body 3″, head 1″, ear 0″·65, tragus 0″·3, forearm 2″·1, thumb 0″·5; third finger—metacarp. 1″·5, 1st ph. 0″·7, 2nd ph. 0″·9, 3rd ph. 0″·6; fourth finger—metacarp. 1″·35, 1st ph. 0″·55, 2nd ph. 0″·55; fifth finger—metacarp. 1″·4, 1st ph. 0″·6, 2nd ph. 0″·55; tibia 0″·65, calcaneum 0″·25, foot 0″·4.

Hab. Mexico; Cuba.

This most remarkable form stands alone among the species of Chiroptera, and, indeed, in its peculiar and grotesque physiognomy is unrivalled among known mammals. While resembling many of the species of the group to which it belongs very closely in the form of the teeth, in the general shape of the skull, in the warts of the lower lip, in the colour and peculiar markings of the fur, and in the form of the extremities, it differs quite as remarkably in the presence of the peculiar characters described above.

If, as I believe, *Centurio m'murtrii* be identical with this species, we have added to the other most remarkable peculiarities in struc-

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Cheiromeles torquatus, a species otherwise very widely removed. In *Centurio m'murtrii*, Allen (which appears to me to be evidently the male of this species), the central neck-band is similarly marked in the centre by a circular depression, but is so very large as to cover the face like a mask when drawn upwards; and there are two other additional bands (probably reduplications of the integument in the neighbourhood of the primary bands caused by their great development), making five bands in all.

ture the presence of secondary sexual characters scarcely less extraordinary. In the specimen preserved in the collection of the Smithsonian Institute the central gular band is (according to Dr. Allen) clothed with soft fur, and so large as to cover the face like a mask when the head is depressed. It is probable that, as in *Cheiromeles torquatus*, this is the receptacle of the odoriferous sections of glands placed in the centre of the inferior surface of the neck.

a. ♀ ad., al. (type). Sir E. Belcher [C.].

Group 4. DESMODONTES.

Muzzle short and conical; nose-leaf distinct, the nostrils opening on the surface of the horizontal leaf; interfemoral membrane very short; tail none.

Dentition. Inc. $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{1-1}{1-1}$ or $\frac{0}{0}$.

Upper incisors very large, canine-like, trenchant, occupying the whole space between the canines; premolars very narrow, with sharp-edged longitudinal crowns; molars rudimentary or none.

Œsophagus very narrow; the cardiac extremity of the stomach greatly elongated, forming a long narrow cæcum*.

Range. The Neotropical Region (except the Antillean Subregion).

The Bats belonging to this group are truly sanguivorous in their habits†, and the nature of their food sufficiently accounts for the remarkable and great divergence in the character of the dentition, and in the form of the alimentary canal, from those of all other species of the Order which they exhibit. So great is the divergence in these respects, that Prof. Huxley was led to form a distinct suborder (*Hæmatophilina*) for their reception, at the same time, however, recognising the importance of Prof. Peters's reasons for classing them with the *Phyllostomidæ*, the latter having pointed out that "the peculiarities of the *Desmodontes* are foreshadowed by the *Stenodermata*, the true molar teeth of which are distinguished by having an external cutting or notched margin, and usually acute cusps on the middle of the masticating surface; while they never have the V-shaped cusps of their allies, and are said to live exclusively on fruits. In several of these genera the total number of molar and premolar teeth does not exceed four on each side, above and below—a character which is also to be regarded as an approximation towards the extreme reduction observed in *Desmodus*"‡.

Not only do I quite agree with Prof. Peters in placing these genera in the family *Phyllostomidæ*, but I have, in my classification of the genera of Chiroptera, even considered them as forming only a group of the subfamily *Phyllostominæ*, so closely, in my opinion, do they approach the *Stenodermata*. Remembering the great varia-

* See description of alimentary canal of *Desmodus rufus* at p. 548.
† See notes on the habits of *Desmodus rufus*, p. 549.
‡ P. Z. S. 1865, p. 389.

bility in the form of the skull and teeth in this family (such, for instance, as exists between such closely allied genera as *Artibeus* and *Stenoderma*, or between genera of connected groups, as *Chæronycteris* and *Phyllostoma*), I am unable to consider the peculiar dentition and form of the alimentary canal, which are specially adapted to the food of the animal, sufficient reason for constituting a distinct subfamily; while their direct relationship to the *Phyllostominæ* is so well shown in all other respects, in the position of the nostrils and form of the nose-leaf, in the shape of the ear and tragus, in the structure of the wings, and even in the greatly modified dentition.

Brachyphylla appears to me to be most closely related of all known genera of *Phyllostomidæ* to this group. The nose-leaf is almost quite similar to that of *Diphylla*, the divided lower lip is like that of *Desmodus*, while it agrees with both in the form of the muzzle and of the ear-conch and tragus, and very closely in the relative lengths of the bones of the fingers; the middle upper incisors, if sufficiently increased in size, would be quite similar to those so characteristic of this group; and even the structure of the alimentary canal, so very peculiar in *Desmodus*, is foreshadowed in the narrow œsophagus, short pyloric and expanded cardiac extremity of the stomach in *Brachyphylla*.

Synopsis of the Genera.

I. Calcaneum none; interfemoral membrane developed in the middle; true molars none, lower incisors small, in pairs, separated by a space ..... 32. DESMODUS, p. 546.

II. Calcaneum very short; interfemoral membrane not developed in the middle; molars $\frac{1-1}{1-1}$, rudimentary; lower incisors very broad, forming a row between the canines ..... 33. DIPHYLLA, p. 550.

32. DESMODUS.

Desmodus, *Wied, Beitr. zur Naturgesch. Brasil.* ii. p. 231 (1826); *Wagner, Suppl. Schreb. Säugeth.* i. p. 779 (1844); *Gervais, Expéd. du Comte de Castelnau, Zoologie*, p. 31 (1855).
Edostoma, *D'Orbigny, Voy. dans l'Amériq. Mérid.* iv. p. 11.

Muzzle short and conical; nostrils opening by oblique apertures on the surface of a small nose-leaf, which is bounded behind by glandular elevations; lower lip and chin with a deep V-shaped groove in front; ears separate; interfemoral membrane short, developed in the middle, but not extending to the heels; no calcaneum or tail.

Dentition. Inc. $\frac{2}{2-2}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{0}{0}$.

Lower incisors in pairs, separated by a space in front.

1. Desmodus rufus.

Desmodus rufus, *Wied, Beitr. zur Naturgesch. Brasil.* p. 233 (1826); *Blainville, Ostéographie,* pl. vii. (skull), pl. xiii. (teeth); *Wagner, Suppl. Schreb. Säugeth.* v. p. 614 (1855); *Gervais, Expéd. du Comte de Castelnau, Zoologie,* p. 31, pl. viii. fig. 6, and pl. ix. fig. 1 (1855); *Huxley, P. Z. S.* 1865, pp. 386–390 (woodcut of alimentary canal).

Edostoma cinerea, *D'Orbigny, Voy. de l'Amérique Mérid.* iv. p. 11, pl. viii.

Desmodus d'orbignyi, *Waterhouse, Voy. of the 'Beagle,' Mamm.* p. 1, pls. i. & xxxv. fig. 1 (skull); *Gay, Hist. de Chile, Zoolog.* p. 33 (1847).

Desmodus murinus, *et* rufus *et* d'orbignyi, *Wagner, op. cit.* i. pp. 377–380 (1844).

Desmodus fuscus, *Lund, Burmeister, Thiere Brasiliens,* p. 57 (1854).

Muzzle very short and conical, the distance from the eye to the end of the nose is much less than the distance between the eyes: nose-leaf short, the centre of its upper margin deeply notched, front margin continuous with the upper lip, nostrils opening by oblique slits in its front and upper surface; laterally and behind it is bounded by a deep groove, which is divided into three cells by two ridges passing backwards from the base of the leaf above, connecting it with the base of a nodular elevation between the eyes, which is also connected on each side with a glandular elevation placed in front of the eye and showing on its surface the apertures of three small ducts; lower lip with a central groove in front bounded externally by large triangular naked elevations, as in *Vampyrus*: both the upper and lower lips are thin-edged and apparently expansible, at the angles of the mouth folded slightly outwards: ears quite separate, short, rising but slightly above the crown of the head, which is raised above the face-line; inner margin strongly convex in lower half, then abruptly straight, rounded off at the tip, beneath which the outer margin is slightly concave, then convex, with a small wart clothed with long hairs opposite the base of the tragus, shortly beyond which it terminates; tragus longer than broad, trapezoidal, acutely pointed, the inner side much thickened, lower third of the outer margin irregularly and slightly toothed, the front surface clothed with long hairs (Plate XXX. figs. 7, 7 *a*).

Thumb very long and strong, much longer than the foot, quite free from the membrane, at the base of the metacarpal bone and to the inner side a small projecting cushion, a similar but smaller cushion is placed under the metacarpo-phalangeal joint; claw short, but slightly curved. First phalanx of the middle finger scarcely more than one fifth the length of the metacarpal bone, and two thirds the length of the second phalanx; metacarpal bones of the fourth and fifth fingers progressively slightly shorter than that of the middle finger; wing-membrane from the ankles or tarsus; no calcaneum or tail; interfemoral membrane extending across from the middle of one tibia to the other, about half an inch deep in the centre; feet moderately large and broad, with feeble claws; inner

side of the heel and base of the toes with small projecting cushions homologous to those of the thumb. All the bones of the extremities are remarkably strong, and the fibula as well as the tibia is well developed.

Above reddish brown, the base of the hairs light yellowish; beneath much paler throughout, pale yellowish or pale yellowish brown; but various shades of reddish brown, occasionally with an ashy tinge, occur in different individuals. The upper surface of the antebrachial membrane, the wing-membrane as far outwards as a line drawn from the elbow to the foot, and the interfemoral are clothed with short reddish-yellow hairs.

Brain-case large, spheroidal, without prominent ridges or crests, thus indicating the weakness of the muscles of mastication; facial portion of the skull very short and narrow, the canine being close in front of the infraorbital foramen and the nasal aperture in a line with the anterior margin of the orbits; the bony palate is consequently very short, but extends backwards as far as the middle of the zygomatic arch; basioccipital wide, excavated; auditory *bullæ osseæ* moderately large, the cochleæ but half concealed by the tympanic bullæ.

The upper single pair of incisors very large, each tooth forming an oblique-angled triangle, whereof the shortest side is inwards and close to the corresponding side of the opposite tooth; the inferior and longest side is slightly concave, and forms a very sharp cutting-edge, extending from the base of the canine to the acutely-pointed summit of the tooth in the centre; canines smaller than the incisors, but with very sharp anterior and posterior cutting-edges; the pair of upper (?) premolar teeth small, laterally compressed, with longitudinal cutting-edges continuous with the base of the canine and with each other; lower incisors small, bifid, in pairs, separated from the canines and also by a space in front; lower (?) premolars narrow, like those in the upper jaw, but the anterior tooth is slightly larger than the others, separated by a small space from the canine, and its cutting-edge is directed backwards and upwards.

Behind the lower incisors the jaw is deeply hollowed out to receive the extremities of the large upper incisors (Plate XXX. fig. 7 *b*).

With the above-described peculiar dentition there is associated as remarkable a departure from the general type in the form of the stomach.

The œsophagus, which scarcely exceeds one of the larger blood-vessels in diameter, opens at right angles into a narrow intestine-like stomach, which almost immediately terminates on the right, without a distinct pylorus, in the duodenum, but on the left forms a greatly elongated cæcum bent and folded upon itself, which appears at first sight like part of the intestines. This, the cardiac extremity of the stomach, is, for a short distance to the left of the entrance of the œsophagus, still very narrow, but soon increases in size till near its termination it attains a diameter quite three times that of the short pyloric portion. The length of this cardiac diver-

ticulum of the stomach appears to vary from two to five or six inches, the size in each specimen probably depending on the amount of food obtained by the animal before it was captured.

Length, head and body 3″, head 1″, ear 0″·75, tragus 0″·3, forearm 2″·5, thumb 0″·65; third finger—metacarp. 2″·1, 1st ph. 0″·45, 2nd ph. 0″·65, 3rd ph. 0″·65; fourth finger—metacarp. 2″·05, 1st ph. 0″·4, 2nd ph. 0″·6; fifth finger—metacarp. 2″, 1st ph. 0″·4, 2nd ph. 0″·6; tibia 1″·05, foot 0″·6.

Hab. Mexican Subregion (Oaxaca; Vera Paz, Guatemala); Brazilian Subregion (Ecuador, Bolivia, Guiana, Para, Mato Grosso, Sta. Catherina); Chilian Subregion (Peru; Coquimbo, Chili).

The first published description of the very peculiar form of the stomach of this species appears to be that by Professor Huxley in the 'Proceedings' of the Zoological Society for April 1865. Prof. Peters, of Berlin, had previously noted (in the MS. pages of a work on the Mammalia not yet published) the presence in the *Desmodontes* of an intestiniform appendage to the stomach; but no other zoologist seems to have been aware of the existence of this remarkable departure from the simple type of stomach found in all other groups of Microchiroptera.

The blood-thirsty propensities of some of the Bats of the Neotropical Region were long known to travellers, and several species of other groups of this family were set down as blood-suckers by various eminent travellers and naturalists, and named accordingly. Thus the name *Vampyrus* was suggested to Geoffroy and adopted by Spix, who also considered that the Bats of the group *Glossophagæ* were addicted to blood, and accordingly described *Glossophaga soricina* (*G. amplexicaudata*, Spix) as a very cruel blood-sucker ("*sanguisuga crudelissima*"), believing that the long fibrillated tongue was used to increase the flow of blood. Waterton considered *Artibeus* (?)*planirostris* (now known to be frugivorous in its habits) to be the veritable Vampire; but neither he nor any of the naturalists that preceded him had succeeded in detecting any individual in the act of drawing blood. It fell to the lot of Mr. Charles Darwin to determine one of the species at least; and the following is his account of the circumstances under which the discovery of the sanguivorous habits of this species was made:—"The Vampire Bat is often the cause of much trouble by biting the horses on their withers. The injury is generally not so much owing to the loss of blood, as to the inflammation which the pressure of the saddle afterwards produces. The whole circumstance has lately been doubted in England; I was therefore fortunate in being present when one (*Desmodus d'orbignyi*, Wat.) was actually caught on a horse's back. We were bivouacking late one evening near Coquimbo, in Chili, when my servant, noticing that one of the horses was very restive, went to see what was the matter, and fancying he could detect something, suddenly put his hand on the beast's wither's, and secured the Vampire"*.

* 'Naturalist's Voyage Round the World,' p. 22 (1838).

a, *b*. ad. sks.	Oaxaca, Mexico.	
(In an old gold-mine shaft, 30 to 40 yards from the surface.)		
c. ad. sk.	Vera Paz, Guatemala.	O. Salvin, Esq. [C.].
d, *e*. juv. et ad. ♂, al.	Ecuador.	Mr. Fraser [C.].
f. ad. sk.	Ecuador.	Prince Bonaparte [C.].
g. ♂ ad., al.	Peru.	Lord Lilford [P.].
h. ad. sk.	Coquimbo, Chili.	Charles Darwin, Esq.
(Skin of individual caught in the act of sucking the blood of a horse, referred to in Mr. Darwin's 'Naturalist's Voyage.' Type of *D. d'orbignyi*, Waterhouse, and original of figure and description in the Voyage of the 'Beagle'.)		
i. ad. sk.	Chili.	Mr. Bridges [C.].
j. ad. sk.	Sta. Catherina, Brazil.	Purchased.
k. ad. sk.	Brazil.	Purchased.
l. ad. sk.	Bolivia.	Purchased.
m. ad. sk.	No history.	
n. skull.	(Labelled *Desmodus d'orbignyi*.)	

33. DIPHYLLA.

Diphylla, *Spix, Simiar. et Vespert. Brasil.* p. 68 (1823); *Wagner, Suppl. Schreb. Säugeth.* i. p. 383 (1844), v. p. 615 (1855).

Muzzle and ears as in *Desmodus*; lower lip reflected outwards in front of the incisors, not grooved; interfemoral membrane not developed in the centre; calcaneum short; tail none.

Dentition. Inc. $\frac{2}{4}$, c. $\frac{1-1}{1-1}$, pm. $\frac{2-2}{3-3}$, m. $\frac{1-1}{1-1}$.

The single molars in the upper and lower jaws rudimentary, and not distinguishable by form from the premolars.

This genus, like *Desmodus*, is represented by a single species only.

1. Diphylla ecaudata.

Diphylla ecaudata, *Spix, op. cit.* p. 68, pl. xxxvi. fig. vii.; *Wagner, l. c.*

Slightly smaller than *Desmodus rufus*, which this species resembles in the form of the ear-conch, muzzle, and upper incisors. The upper margin of the small leaf above the nasal apertures is straight or very slightly concave, and posteriorly a raised (?)glandular ridge forms a semicircle between and behind the eyes, somewhat broader on the sides, but not thickened in the centre; lower lip reflected outwards in front of the lower incisors, forming a square-sided naked surface; angles of the mouth folded outwards, as in *Desmodus rufus*. Form of the ear-conch very similar to that of *D. rufus*; tragus broader above, with an obtuse extremity, and a well-defined lobule at the base of the outer margin.

Metacarpal bone of the thumb much shorter than in *D. rufus*, and almost contained within the membrane; but the relative proportions of the other bones of the finger very similar to those of that species.

Wing-membrane from the tarsus or metatarsus; interfemoral membrane margining the legs, not developed in the centre; calcaneum short, projecting.

Fur, above, reddish brown; beneath, yellowish white, darker at the base of the hairs.

Skull very similar to that of *D. rufus*, but the jaws are slightly longer, owing to the presence of an additional rudimentary molar in both jaws. Lower incisors narrow, much expanded in the direction of the jaws, pectinated, forming a semicircular row, touching each other; the outer incisors wider than the inner ones, with six notches, the inner incisors with three; upper incisors and canines as in *D. rufus*; the two upper premolars nearly equal in size, narrow, with sharp-edged slightly notched crowns; close behind them the single very small oval molar, its long diameter at right angles to the direction of the jaw; in the lower jaw the premolars are smaller and the molar larger, the first premolar with a slight indication of a central cusp equal in size to the third, which is somewhat similar in shape, and larger than the second, which slightly exceeds in size the rudimentary molar.

The alimentary canal (which I have not had an opportunity of examining) is probably generally similar to that of *Desmodus rufus*.

Length, head and body, about 2″·6, head 1″, ear 0″·65, tragus 0″·3, forearm 2″, thumb 0″·5; third finger—metacarp. 2″, 1st ph. 0″·45, 2nd ph. 1″·1, 3rd ph. 0″·9; fourth finger—metacarp. 2″, 1st ph. 0″·4, 2nd ph. 0″·8; fifth finger—metacarp. 1″·95, 1st ph. 0″·45, 2nd ph. 0″·65; tibia 0″·7, foot 0″·55*.

Hab. Brazil.

* Prof. Peters most kindly afforded me an opportunity of examining (during my visit to the Berlin Museum) a well-preserved specimen of this little-known species.

ADDENDA ET CORRIGENDA.

Page 2. **MEGACHIROPTERA.**

To definition add:—

Second finger with three phalanges: Spigelian lobe of the liver ill-defined or absent.

Page 2. **MICROCHIROPTERA.**

To definition add:—

Second finger with a single rudimentary phalanx, rarely (in *Rhinopoma* only) with two: Spigelian lobe of the liver well developed and separate.

Page 7. **Epomophorus monstrosus.**

In Table, *for* 2nd and 4th fingers *read* 3rd and 5th fingers *respectively*.

Line 13 from bottom, *for* "*d.* ♀ imm." *read* "*d.* ♂ imm."

Page 9. **Epomophorus macrocephalus.**

In Table, *for* 2nd and 4th fingers *read* 3rd and 5th fingers *respectively*.

Page 36. **Pteropus samoensis.**

Add:—

h. ♂ ad., al.	Samoa.	Rev. S. J. Whitmee [C.].

Page 51. **Pteropus edulis.**

Line 1 from top, *for* "*f.* ♀ juv." *read* "*f.* ♂ juv."

Page 59. **Pteropus fuscus.**

Line 7 from bottom, *after word* "backwards" *insert* (Plate IV. fig. 5).

Page 65. **Pteropus keraudrenii.**

Add:—

w. ♀ imm.	Samoa.	Rev. S. J. Whitmee [C.].

Page 92.

Between lines 5 and 6 from bottom insert

"Group 2. MACROGLOSSI."

Page 143. **Phyllorhina speoris.**

To synonymy add:—

Hipposideros aureus *et* templetonii, *Kelaart, Prodr. Faun. Zeylan.* pp. 17, 18.

Page 159. **Megaderma spasma.**

Add:—

y. ♂ ad., al.	Placer, N.E. Mindanao.	Purchased.

Page 170. **THYROPTERA.**

This genus should form Group IV. of Vespertilionidæ.

Page 172. **Nyctophilus timoriensis.**

To synonymy add:—

Barbastellus pacificus, *Gray, Zoolog. Miscell.* 1831, p. 38.

Page 203. **Vesperugo propinquus.**

For "Vesperugo propinquus, *Peters*," *read* "Vesperus propinquus, *Peters*."

Page 260. **Scotophilus temminckii.**

Add:—

a''. ♀ ad., al.		Sir E. Belcher [C.].

Page 260. **Scotophilus heathii.**

Add:—

g. ♂ ad., al.	No history.	

Page 301. **Vespertilio goudotii.**

For "Plate XIX. fig. 6" *read* "Plate XIX. fig. 5."

Page 320. **Vespertilio nigricans.**

Add:—

m. ♂ imm., al.	Ecuador.	Mr. Buckley [C.].

Page 346. **Thyroptera tricolor.**

For third finger—2nd ph. 0″·25 *read* third finger—2nd ph. 0″·4, 3rd ph. 0″·25.

Page 346. **MINIOPTERUS.**

Line 21 from bottom, for *first phalanx of the second* read *first phalanx of the third.*

Page 417. **Molossus perotis.**

Add:—

d. ad. sk.	Cordova, La Plata.	Purchased.

ALPHABETICAL INDEX.

[Recognised names of species and varieties &c. are printed in italics, synonyms in Roman characters.]

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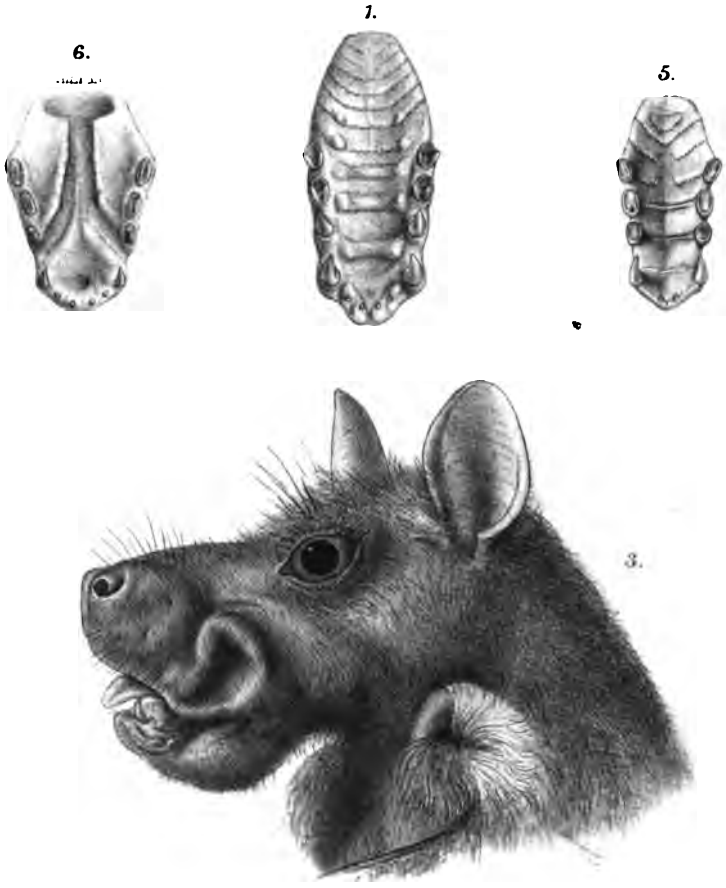
R Mintern del et lith.

Mintern Bros. imp.

Epomophorus (Hypsignathus) monstrosus.



R. Mintern del. et lith.

Mintern. Bros. imp.

1. Epomophorus (Hypsignathus) monstrosus.
2. Epomophorus macrocephalus. 3. E. gambianus.
4. E. franqueti. 5. E. comptus. 6. E. pusillus.

1.

5.

3.

6.

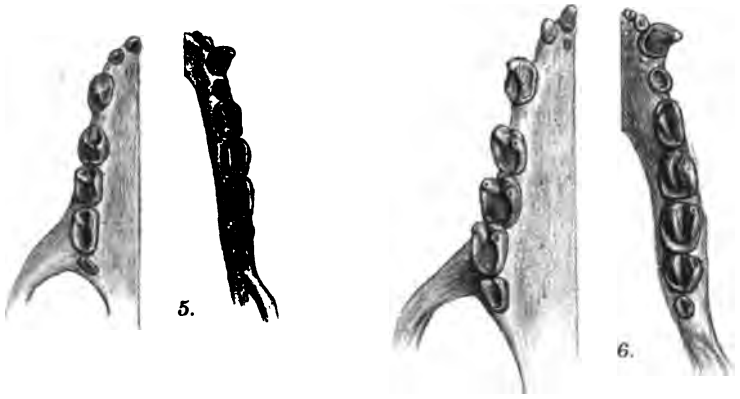
2.

4.

R. Mintern del. et lith.

Mintern Bros. imp.

1. Pteropus dasymallus. 2. Pt. lombocensis. 3. Pt. rodericensis.
4. Pt. brunneus. 5. Pt. macrotis. 6. Pt. livingstonii.

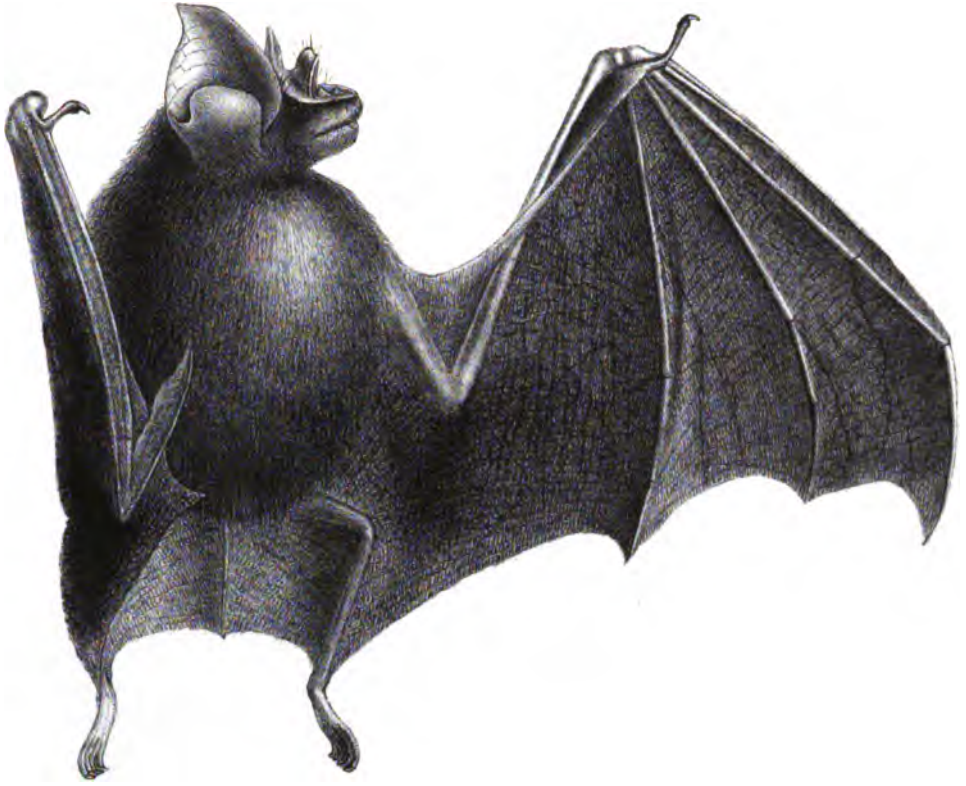


R Mintern del. et lith. Mintern Bros. imp

1, Pteropus leucopterus. 2, Pt. aneiteanus. 3, Pt. scapulatus.
4, Pt. lombocensis. 5, Pt. fuscus. 6, Pt. jubatus.

R. Mintern del et lith. Mintern Bros. imp.

1. Cynonycteris torquata. 2. C. brachyotis.
3. Cynopterus latidens.

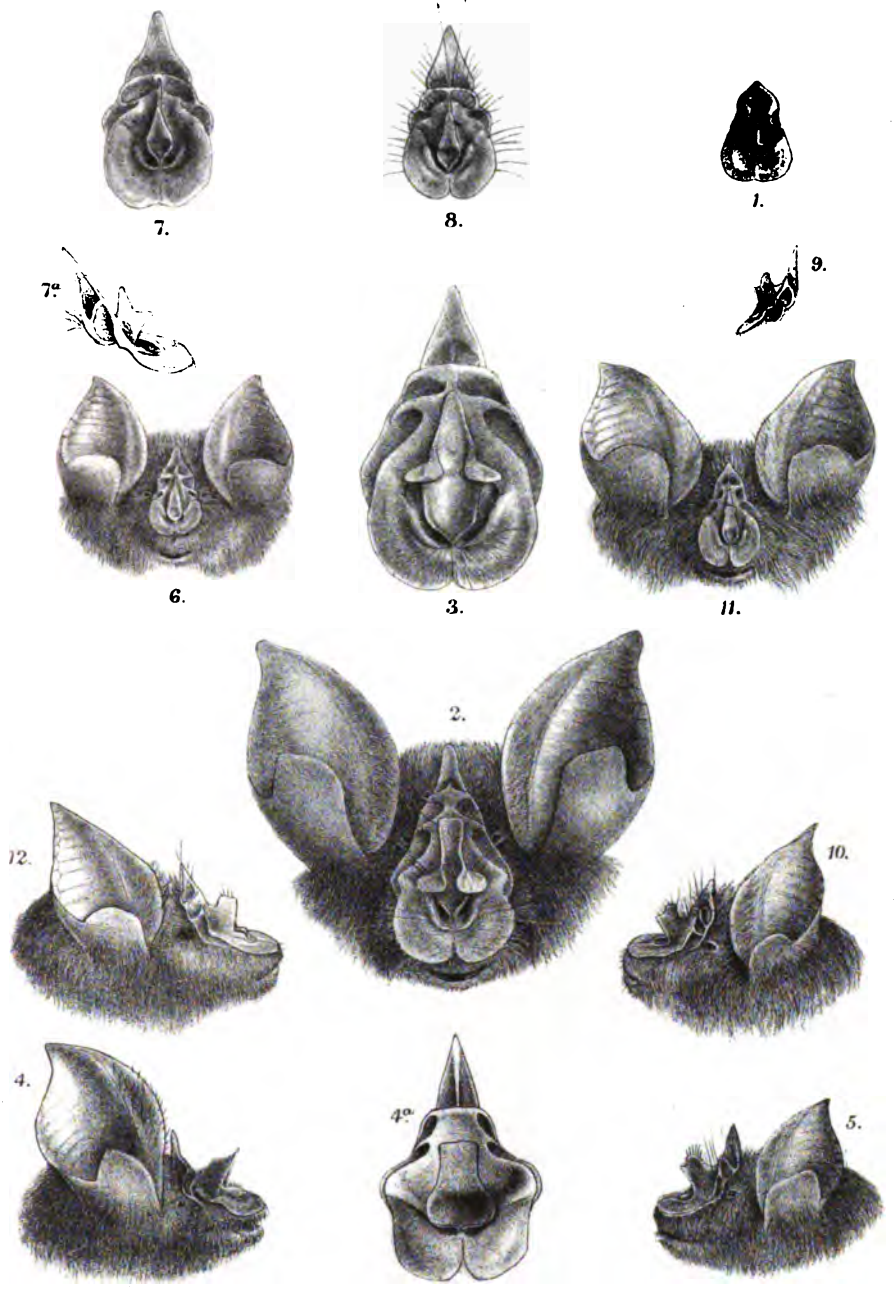


1a.

R. Mintern del. et lith.

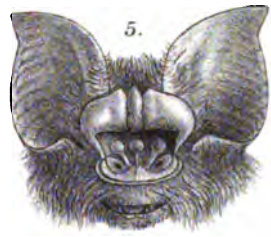
Mintern Bros. imp.

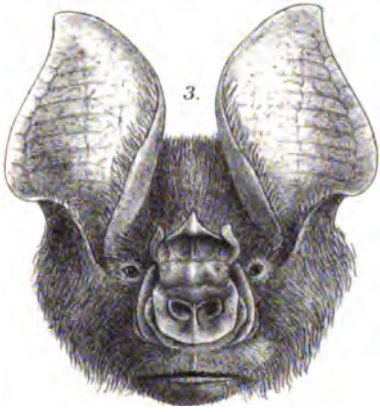
Rhinolophus euryotis.
1a. Nose-leaf (enlarged.)

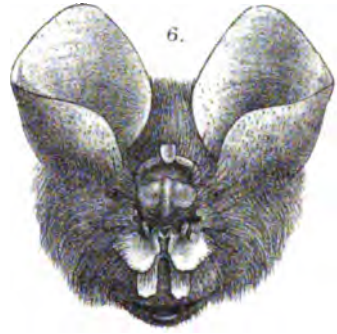


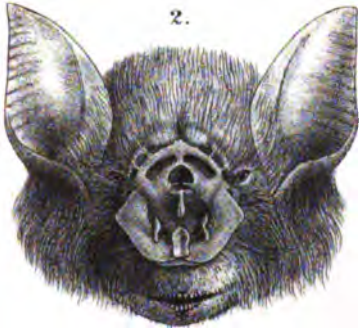
R. Mintern del. et lith. Mintern Bros. imp.

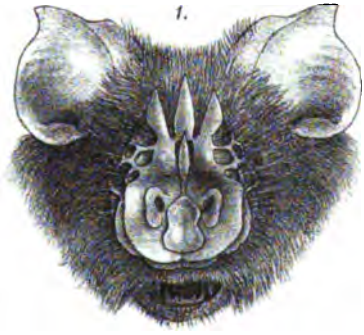
1. Rhinolophus calophyllus. 2. Rh. luctus. 3. Rh. trifoliatus.
4. Rh. philippinensis. 5. Rh. affinis. 6. Rh. euryale. 7. Rh. blasii.
8. Rh. hipposideros. 9. Rh. landeri. 10. Rh. ferrum-equinum.
11. Rh. capensis. 12. Rh. æthiops.





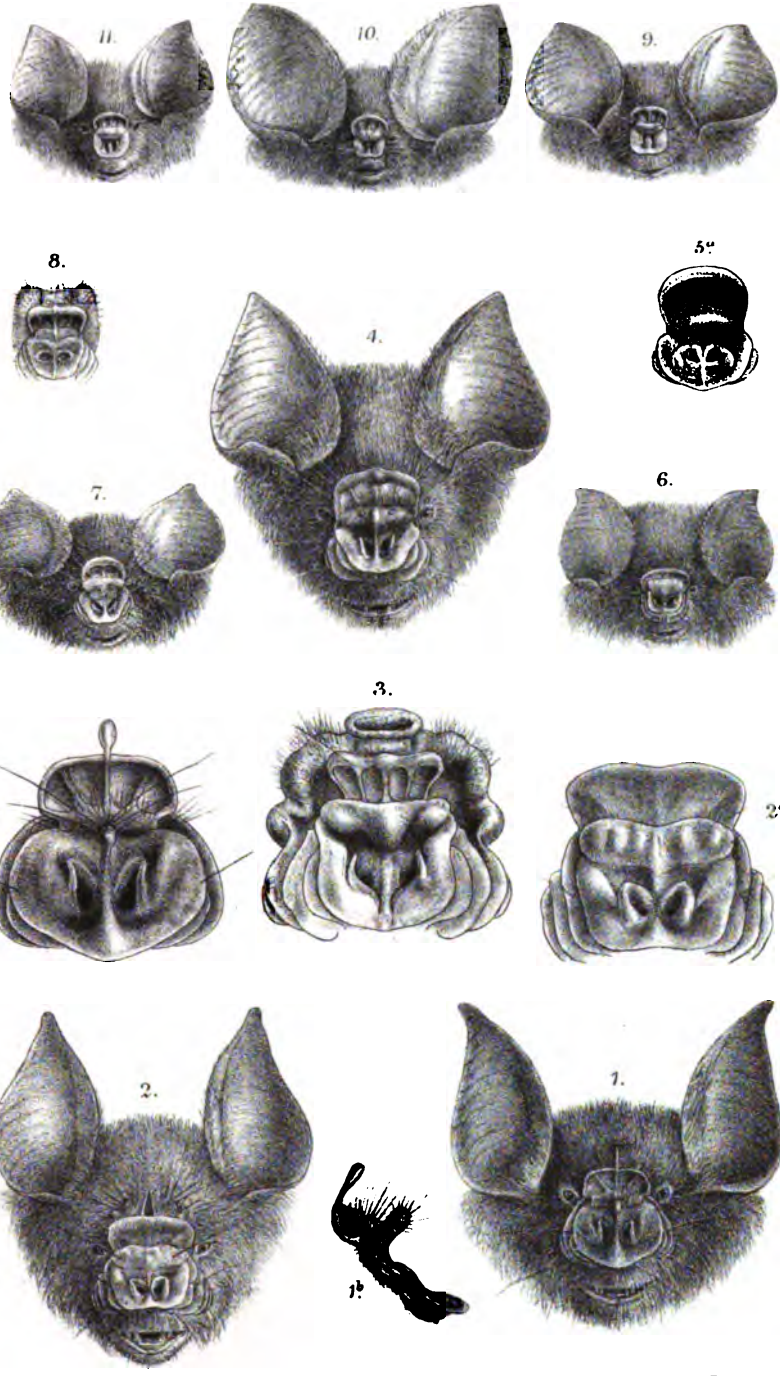






R. Mintern. del. et lith. Mintern Bros imp.

1, Triaenops persicus. 2, Rhinonycteris aurantia. 3, Phyllorhina tridens. 4, Ph. tricuspidata. 5, Ph. stoliczkana. 6, Cæolops frithii.



R Mintern del. et lith. Mintern Bros. imp.

1.Phyllorhina cyclops. 2.Ph. commersonii. 3.Ph. armigera. 4.Ph. diadema. 5.Ph. pygmœa. 6.Ph. fuliginosa. 7.Ph. cervina. 8.Ph. larvata. 9.Ph. bicolor. 10.Ph. fulva. 11.Ph. ambuinensis.

1b 1. 1a

2b 2. 2a

3b 3. 3a

R. Mintern del. et lith. Mintern Bros. imp.

1. Megaderma spasma. 2. M. lyra. 3. M. frons.

6b.

1.

4.

6a.

2.

3.

5.

4a.

6.

7.

9.

10.

8.

R. Mintern del. et lith. Mintern Bros imp.

1, Nycteris hispida. 2, N. javanica. 3, N. æthiopica. 4, N. macrotis. 5, N. thebaica. 6, Antrozous pallidus. 7, Nyctophilus timoriensis. 8, Plecotus (Corinorhinus) macrotis. 9, Plecotus auritus. 10, Synotus barbastellus.

9.

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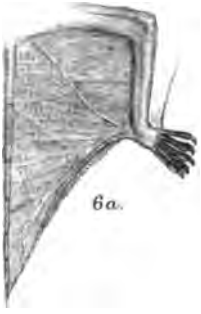


6a.

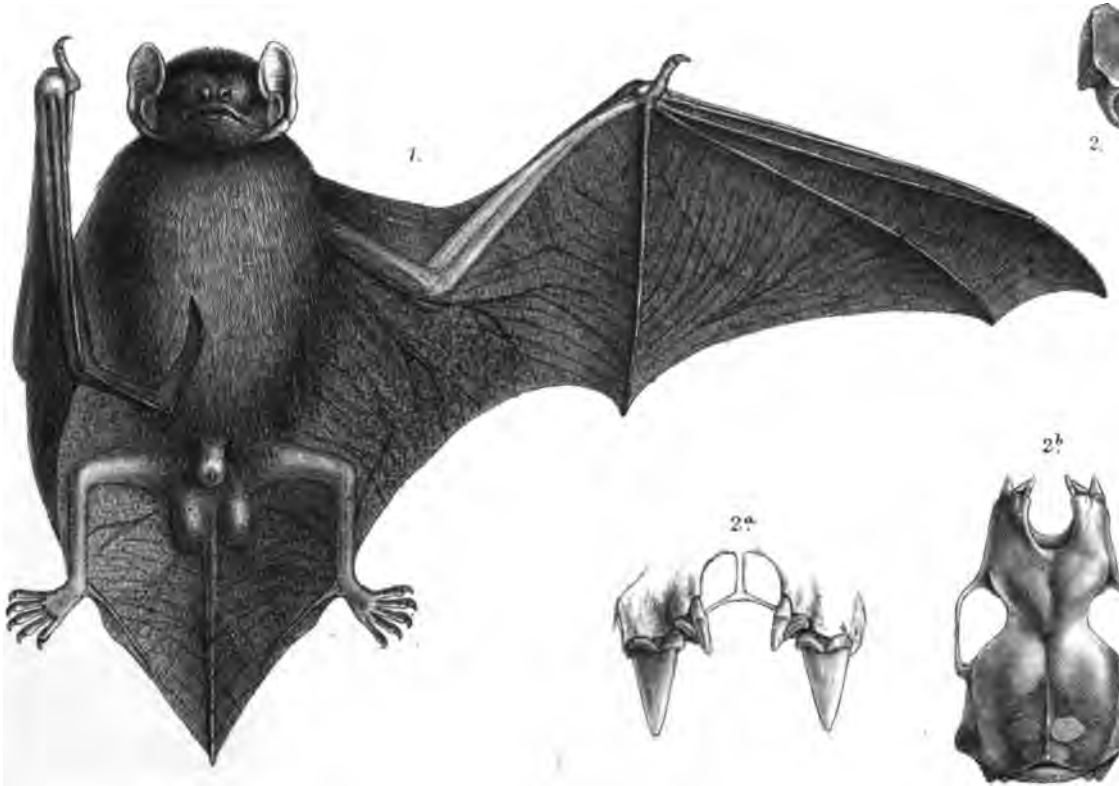
6.

4.

1.

R. Mintern del. et lith. Mintern Bros. imp.

1. Vesperugo platyrhinus. 2. V. pumilus. 3. V. tickelli.
4. V. noctula. var. lasiopterus. 5. V. maderensis.
6. V. pulcher. 7. V. georgianus. 8. V. tylopus. 9. V. nanus.



R.Mintern del. et lith.

Mintern Bros. imp.

1. Vesperugo stenopterus. 2-2b. V. noctula. 3. V. (Scotozous) dormeri.

3.

2.

1.

3a.

2a.

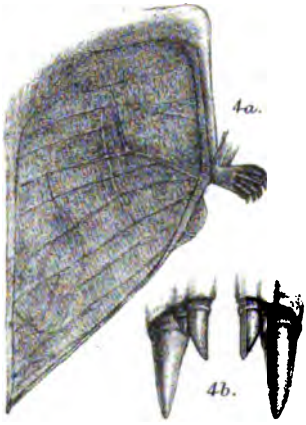
1a.

5.

4.

5a.

6.



4a.

5b.

6a.

4b.

R. Mintern del. et lith.

Mintern Bros imp.

1, Chalinolobus tuberculatus. 2, Ch. signifer. 3, Ch. nigrogriseus. 4, Ch. gouldii. 5, Ch. (Glauconycteris) argentatus. 6, Ch. poensis.

6.

5.

4.

1.

2.

3.

5a.

5b.

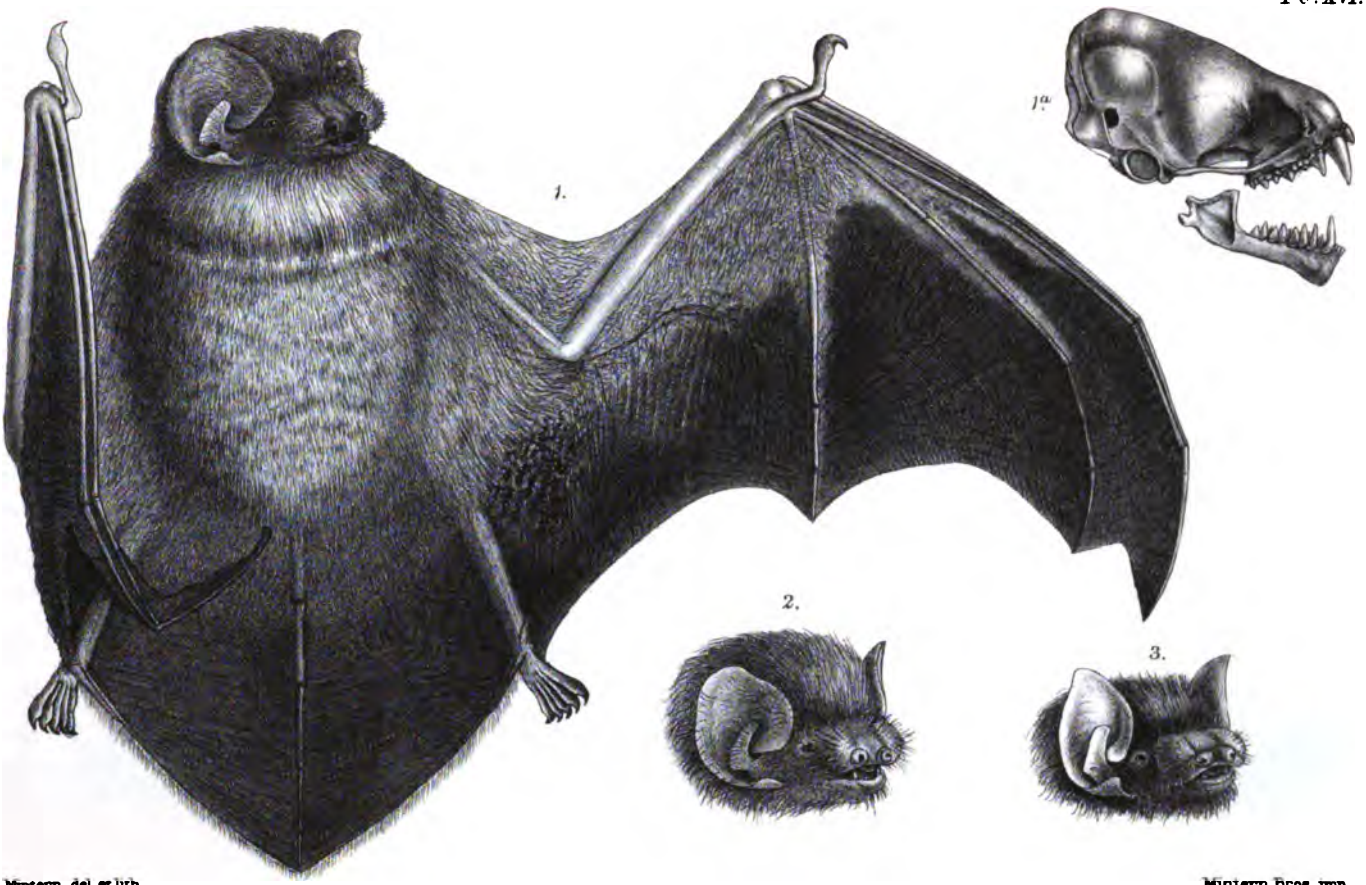
6b.

6a.

R. Mintern del. et lith.

Mintern Bros. imp.

1. Scotophilus gigas. 2. Sc. rueppellii. 3. Sc. pallidus.
4. Sc. greyii. 5. Sc. temminckii. 6. Sc. ornatus.



R. Mintern del. et lith.

Mintern Bros. imp.

1. Atalapha cinerea. 2. A. grayi. 3. A. intermedia.

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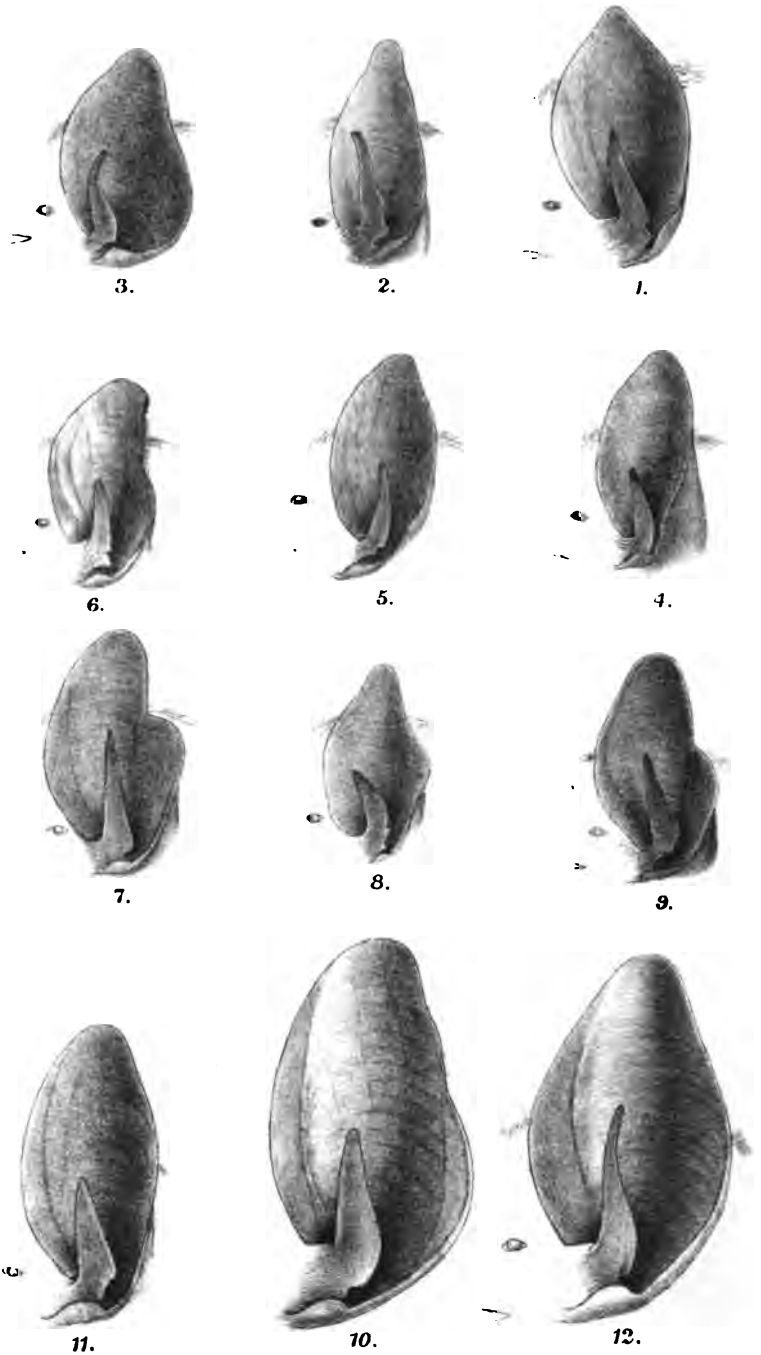
R. Mintern del. et lith.

Mintern Bros imp.

1. Harpiocephalus auratus. 2. H. harpia. 3. H. cyclotis
4. H. leucogaster. 5. Kerivoula lanosa. 6. K. hardwickii.
7. K. pellucida. 8. Natalus stramineus.



R. Mintern del. et lith. Mintern Bros. imp.

1. Vespertilio macrotarsus, 2. V. megalopus. 3. V. capaccinii.
4. V. adversus. 5. V. hasseltii. 6. V. bocagii. 7. V. insularum.
8. V. muricola. 9. V. mystacinus. 10. V. murinus. 11. V. africanus. 12. V. bechsteinii

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R. Mintern. del. et lith. Mintern Bros imp

1, Vespertilio longipes. 2, V. chinensis. 3, V. welwitschii. 4, V. montivagus. 5, V. goudotii. 6, V. levis. 7, V. nitidus. 8, V. albescens. 9, V. nigricans. 10, V. subulatus. 11, V. lucifugus.

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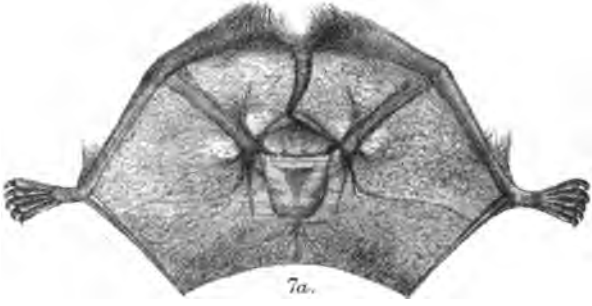
1.



7a.

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6.

R. Mintern. del. et lith.

Mintern Bros imp.

1. Emballonura nigrescens. 2. Coleura seychellensis. 3. C. afra. 4. Rhynchonycteris naso. 5. Taphozous affinis. 6. T. peli. 7. Diclidurus albus. 8. Noctilio albiventer.

2. Molossus nasutus.

1.

1a.

3a.

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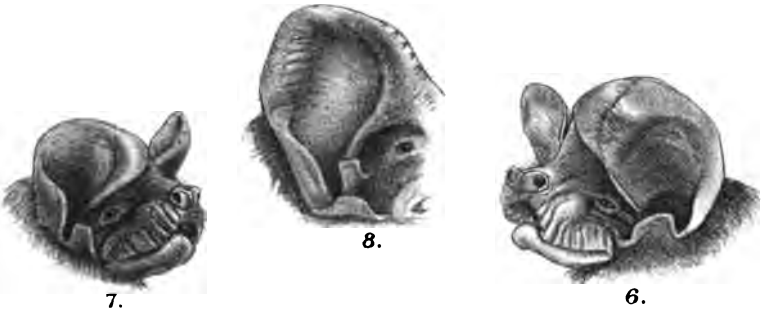
R. Mintern del. et lith.

Mintern Bros. imp.

1. 1a. Cheiromeles torquatus.
2. Molossus nasutus. 3. 3a. M. abrasus. 4. Nyctinomus albiventer. 5. N. acetabulosus.



7. 8. 6.

5. 4. 3.

9. 2. 1.

R. Mintern del. et lith. Mintern Bros imp

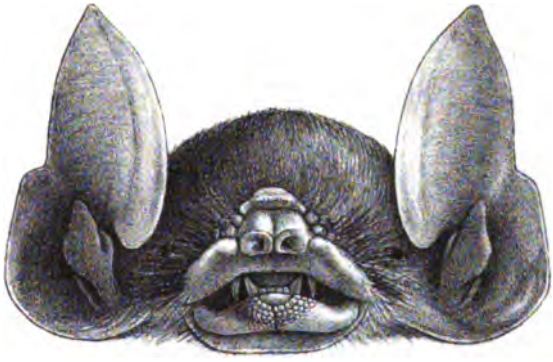
1. Nyctinomus africanus. 2. N. tragatus. 3. N. brachypterus. 4. N. angolensis. 5. N. megalotis. 6. N. macrotis. 7. N. gracilis. 8. N. brasiliensis. 9. N. australis.

6.

1a.

5.

2.



3.

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4.

R. Mintern. del. et lith. Mintern Bros imp.

1. Chilonycteris macleayii. 2. Ch. psilotis. 3. Ch. rubiginosa. 4. Ch. davyi. 5. Mormops megalophylla. 6. M. blainvillii.

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R. Mintern. del. et lith.

Mintern Bros imp

1, Vespertilio longipes. 2, V. chinensis. 3, V. welwitschii.
4, V. montivagus. 5, V. goudotii. 6, V. levis. 7, V. nitidus.
8, V. albescens. 9, V. nigricans. 10, V. subulatus. 11, V. lucifugus.

3.

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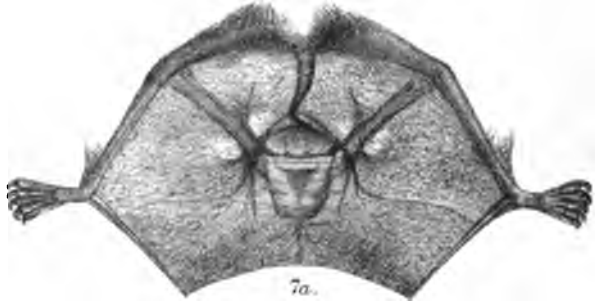

7a.

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6.

R. Mintern. del. et lith. Mintern Bros imp.

1. Emballonura nigrescens. 2. Coleura seychellensis. 3. C. afra. 4. Rhynchonycteris naso. 5. Taphozous affinis. 6. T. peli. 7. Diclidurus albus. 8. Noctilio albiventer.

1.

1a.

3a.

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4.

2.

R. Mintern del. et lith.

Mintern Bros. imp.

1. 1a. Cheiromeles torquatus.
2. Molossus nasutus. 3. 3a. M. abrasus. 4. Nyctinomus albiventer. 5. N. acetabulosus.

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1.

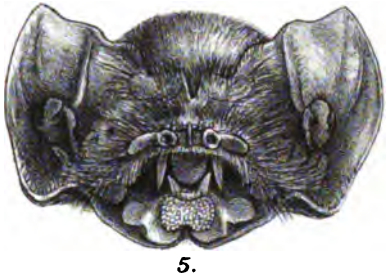
R. Mintern del. et lith.

Mintern Bros imp

1. Nyctinomus africanus. 2. N. trigatus. 3. N. brachypterus. 4. N. angolensis. 5. N. megalotis. 6. N. macrotis. 7. N. gracilis. 8. N. brasiliensis. 9. N. australis.

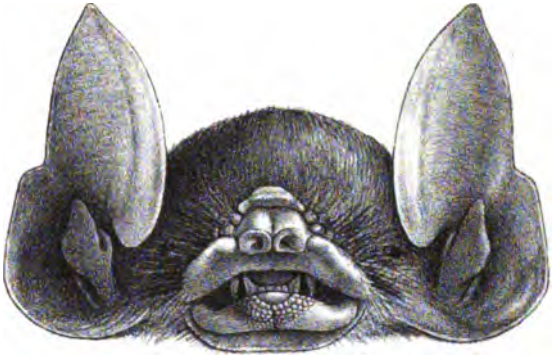
6.

1a.



5.

2.



3.

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4.

R. Mintern. del. et lith. Mintern Bros imp.

1. Chilonycteris macleayii. 2. Ch. psilotis. 3. Ch. rubiginosa. 4. Ch. davyi. 5. Mormops megalophylla. 6. M. blainvilbii.

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5.

3a.

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4a.

6.

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2.

R. Mintern. del. et lith. Mintern Bros imp.

1. Lonchorhina aurita. 2. Macrophyllum neuwiedii. 3. Vampyrus spectrum. 4. V. (Chrotopterus) auritus. 5. Schizostoma megalotis. 6. Phylloderma stenor-

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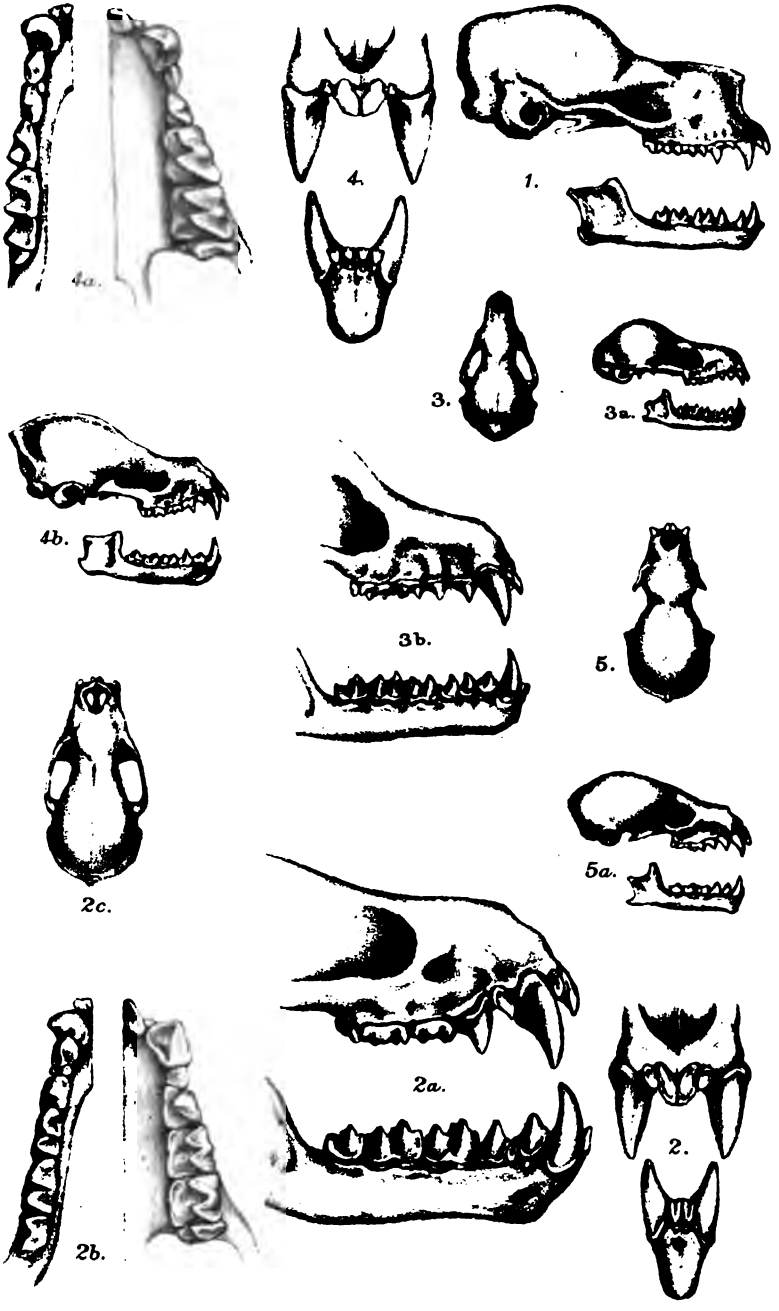
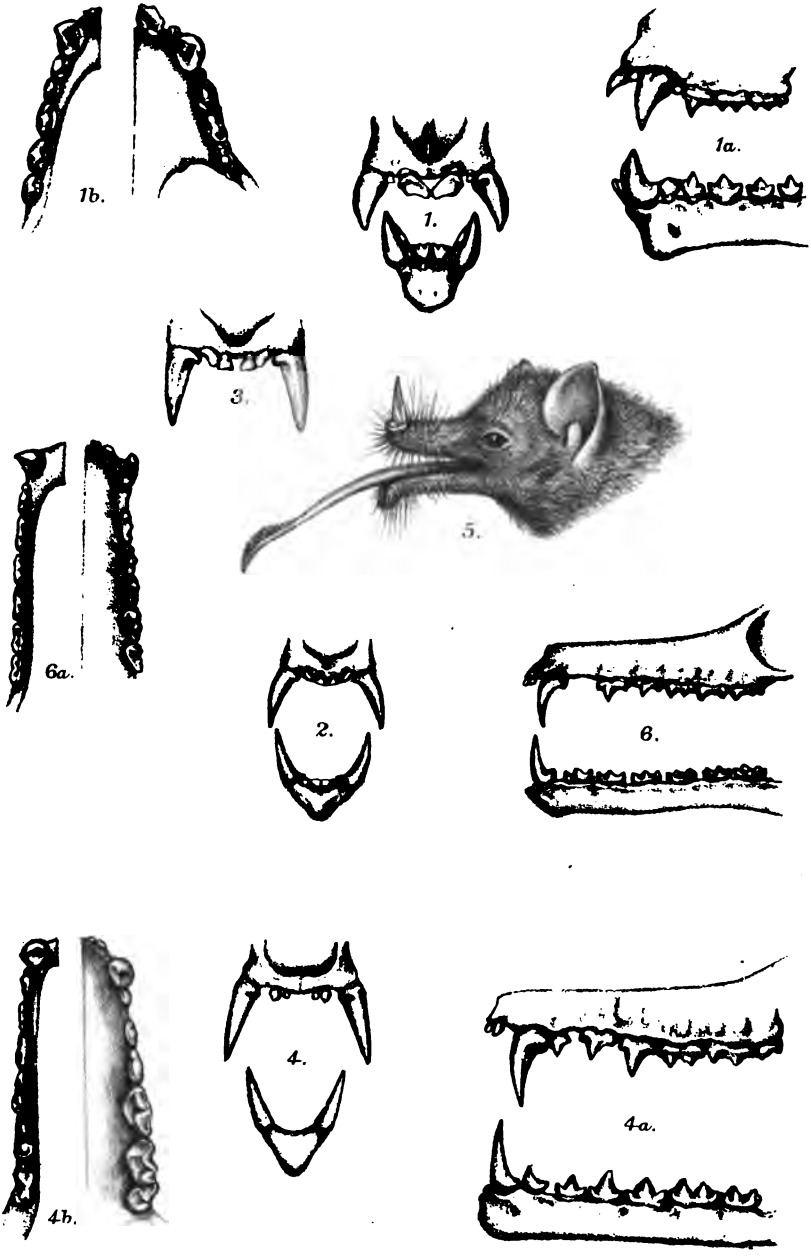
R. Mintern. del. et lith. Mintern Bros imp.

1. Macrotus waterhousii. 2. Trachyops cirrhosus. 3. Phyllostoma hastatum. 4. Phyllostoma elongatum. 5. Tylostoma crenulatum. 6. Mimon bennettii.



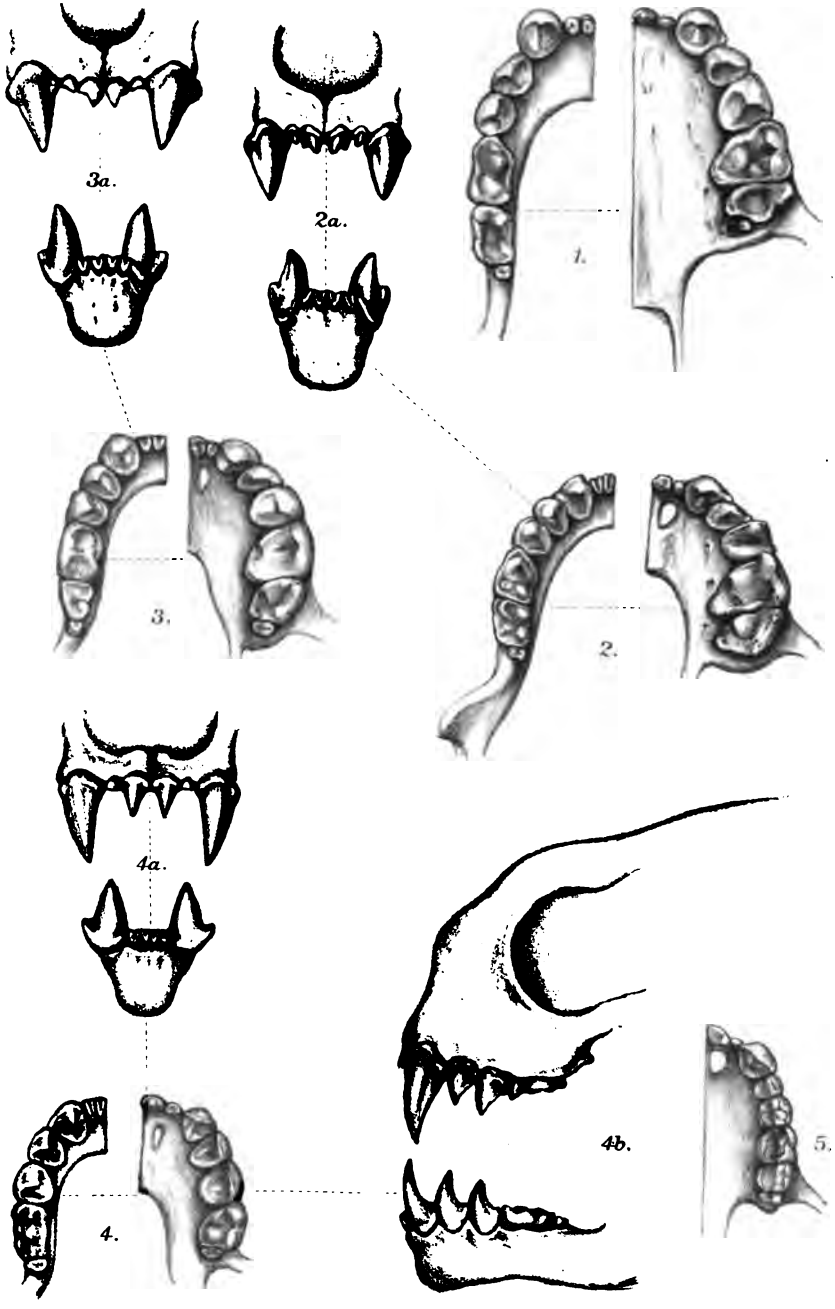
C Berjeau. del. et lith. Mintern Bros imp.

1, Lonchorhina aurita. 2, Lophostoma bidens. 3, Schizostoma megalotis. 4, Trachyops cirrhosus. 5, Carollia brevicauda.



C. Berjeau del. et lith. Mintern Bros imp

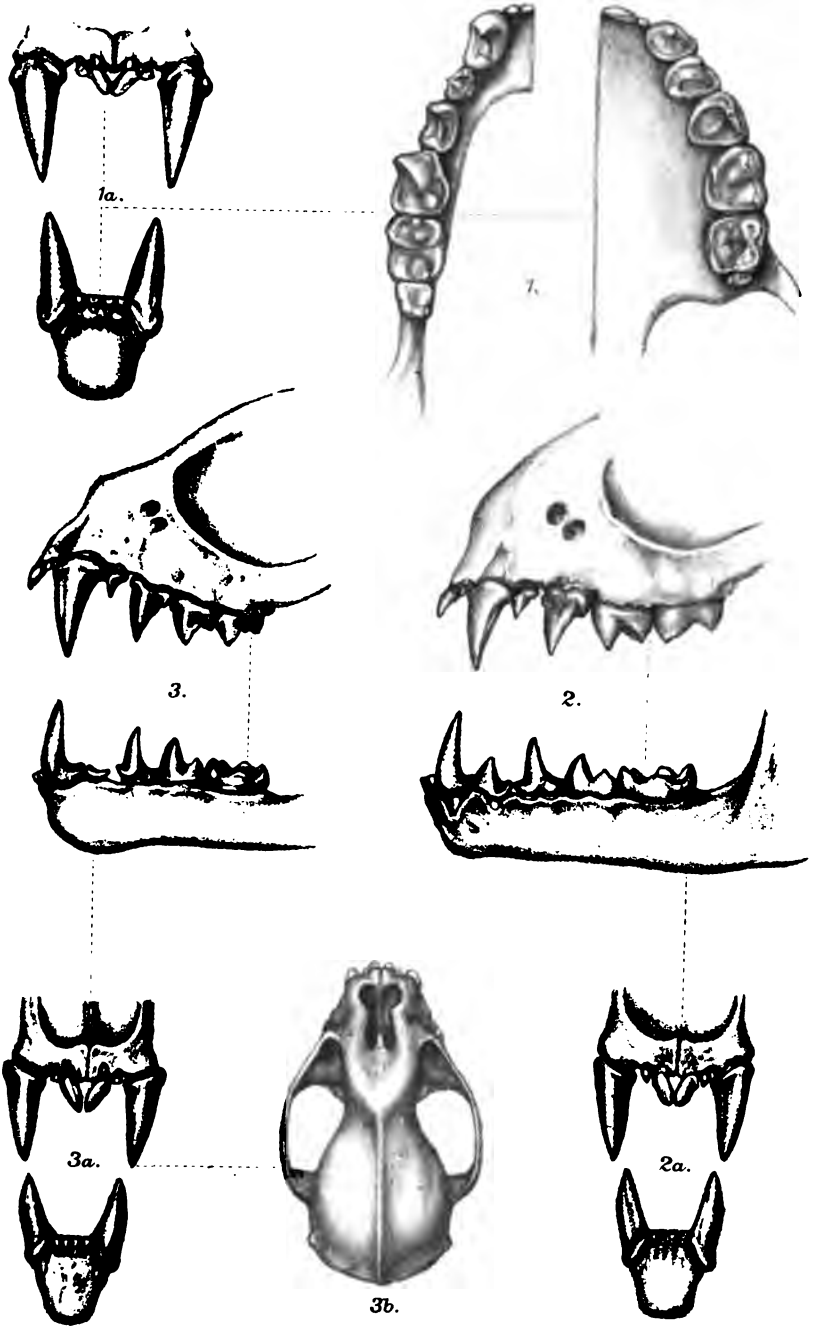
1, Rhinophylla pumilio. 2, Glossophaga soricina. 3, Monophyllus redmani. 4, Lonchoglossa caudifera. 5, Chœronycteris mexicana. 6, Ch. minor.



C. Berjeau. del et lith.

Mintern Bros imp

1, Artibeus planirostris. 2, Stenoderma achradophilum. 3, S. falcatum. 4, Pygoderma bilabiatum. 5, Sturnira lilium.



C. Berjeau del. et lith.

Mintern Bros imp.

1, Vampyrops vittatus. 2, Chiroderma villosum. 3, Ch. salvini.

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6.

4.

5a.

2.

7a.

5b.

5.

7b.

3.

7.

R. Mintern. del. et lith. Mintern Bros imp.

1. Artibeus planirostris. 2. Ametrida centurio. 3. Pygoderma bilabiatum. 4. Sturnira lilium. 5. Brachyphylla cavernarum. 6. Centurio senex. 7. Desmodus r[illegible]

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